

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: M. ANDERSON Examiner #: 76766 Date: 5/22/03
 Art Unit: 1765 Phone Number 308-0086 Serial Number: 10/007563
 Mail Box and Bldg/Room Location: CP3-10E06 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Method for Semiconducting Quantum Particles

Inventors (please provide full names): Wen C. Huang Lulu Song

Earliest Priority Filing Date: _____

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

(quantum dots or nano-particles) ^{crystals} semiconductor

comprized of

(metal of Group IB, IIA, IIB, IIIA
 IVA, and VA and
 includes (from spec)

- Mg, Ca, Sr, Ba, Zn, Cd, Hg, Al
 Ga, In, Tl, Ge, Sn, Pb, Sb, Bi

(P Phosphorus
 As Arsenic
 S Sulfur
 Se Selenium
 Te Tellurium

Phosphide
 Arsenide
 Sulfide
 Selenide
 Telluride
 Compounds.

→ mixed in a liquid and atomized (see claims)

→ treated w a flocculent ~~reactant~~

→ dried

→ coated (see claims)

please search ^{STN} registry and cross with ^{STN} INSPEC, EMA, MATBUS
 databases

see enclosed claims

STAFF USE ONLY

Searcher: EL

Searcher Phone #: _____

Searcher Location: _____

Date Searcher Picked Up: _____

Date Completed: 5-23-03

Searcher Prep & Review Time: 10

Clerical Prep Time: _____

Online Time: 95

Type of Search

NA Sequence (#) _____

AA Sequence (#) _____

Structure (#) (1)

Bibliographic (and)

Litigation _____

Fulltext _____

Patent Family _____

Other _____

Vendors and cost where applicable

STN \$329.41

Dialog _____

Questel/Orbit _____

Dr Link _____

Lexis/Nexis _____

Sequence Systems _____

WWW/Internet _____

Other (specify) _____

0 What is claimed:

1. A method for producing compound semiconductor quantum particles from at least a metallic element selected from Groups IB, IIA, IIB, IIIA, IVA, and VA of the Periodic Table and at least a non-oxygen reactant element selected from the group consisting of P, As, S, Se, and Te, said method comprising the steps of:

- 5 (a) mixing a first precursor composition comprising said at least a metallic element with a second precursor composition comprising said at least a reactant element to form a reacting fluid comprising nanometer-size compound semiconductor clusters being precipitated out of a liquid medium;
- 10 (b) operating an atomizer means to break up said reacting fluid into micron- or nanometer-size fluid droplets, each said fluid droplet containing a predetermined, but small number of said nanometer-size compound semiconductor clusters dispersed in said liquid medium for the purpose of constraining the growth of said clusters;
- 15 (c) directing said fluid droplets into a material treatment means to further separate and/or passivate said clusters to form said compound semiconductor quantum particles; and
- (d) drying and collecting said quantum particles.

2. The method as set forth in claim 1, wherein said compound semiconductor quantum particles comprise particles of phosphide, arsenide, sulfide, selenide, and/or telluride.

3. The method as set forth in claim 1, wherein said atomizer means comprises a vortex atomizer and/or ultrasonic atomizer.

4. The method as set forth in claim 1, wherein said material treatment means comprises

- (C1) means for directing said fluid droplets into a flocculent liquid;
- (C2) means for removing said liquid medium;
- (C3) means for vaporizing said liquid medium;
- 25 (C4) means for capping said clusters with an organic or inorganic capping agent; and/or
- (C5) means for reacting said clusters with a coating agent to form a protective layer on the

0

surface of said clusters.

5. The method as set forth in claim 1, further comprising a step of doping said particles with predetermined dopants.

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6. The method of claim 1, wherein the sub-step of passivating said clusters comprises contacting said clusters with a volatile capping agent selected from the group consisting of ammonia, methyl amine, ethyl amine, acetonitrile, ethyl acetate, methanol, ethanol, propanol, butanol, pyridine, ethane thiol, tetrahydrofuran, and diethyl ether.

7. The method of claim 1, wherein said compound semiconductor clusters have an average particle size of from about 1 to about 20 nm.

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8. The method of claim 1, wherein said compound semiconductor particles are selected from the group consisting of $\text{Cu}(\text{In}_{1-x}\text{Ga}_x)\text{Se}_y$, where x is 0-1 and y is 1 or 2, CdS, ZnSe, ZnS, ZnTe, PbSe, PbS, and PbTe.

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9. The method of claim 1, wherein said first precursor composition is selected from the group consisting of metal halogenides, metal sulfates, metal nitrates, metal phosphates, complex metal salts, metal alcoholates, metal phenolates, metal carbonates, metal carboxylates, and metallo-organic compounds.

10. The method of claim 1, wherein said liquid medium comprises a solvent selected from the group consisting of methanol, ethanol, propanol, butanol, diethyl ether, dibutyl ether, tetrahydrofuran, butoxyethanol, ethyl acetate, pentane, hexane, cyclohexane, and toluene.

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FILE 'HCAPLUS' ENTERED AT 09:39:14 ON 23 MAY 2003

L1 86132 SEA HUANG ?/AU
L2 32052 SEA SONG ?/AU
L3 981 SEA L1 AND L2
L4 5506 SEA HUANG W?/AU
L5 1580 SEA SONG L?/AU
L6 1 SEA L4 AND L5
L7 351290 SEA QUANTUM# OR QUANTA#
L8 15 SEA L3 AND L7
L9 443629 SEA SEMICOND? OR SEMI(A) (COND# OR CONDUCT?)
L10 1 SEA L8 AND L9
L11 424 SEA (L1 OR L2) AND L7 AND L9
L12 53330 SEA CAP OR CAPS OR CAPPED OR CAPPING#
L13 4 SEA L11 AND L12
D L13 1-4 TI

FILE 'LREGISTRY' ENTERED AT 09:43:45 ON 23 MAY 2003

L14 523 SEA M/ELS NOT ((C OR H OR AC OR N OR SB OR BI OR O OR
PO)/ELS OR (A1 OR LNTH OR ACTN OR SHEL OR B6 OR B7 OR B8
OR A3 OR A4 OR A7 OR A8)/PG)
L15 173 SEA (P OR AS OR S OR SE OR TE)/ELS NOT ((C OR H OR AC OR
N OR SB OR BI OR O OR PO)/ELS OR (A1 OR LNTH OR ACTN OR
SHEL OR B6 OR B7 OR B8 OR A3 OR A4 OR A7 OR A8)/PG)
L16 89 SEA ((P OR AS OR S OR SE OR TE)/ELS (L) (A2 OR B3 OR B4
OR B5 OR B1 OR B2)/PG) NOT ((C OR H OR AC OR N OR SB OR
BI OR O OR PO)/ELS OR (A1 OR LNTH OR ACTN OR SHEL OR B6
OR B7 OR B8 OR A3 OR A4 OR A7 OR A8)/PG)

FILE 'REGISTRY' ENTERED AT 09:52:08 ON 23 MAY 2003

L17 8815 SEA ((P OR AS OR S OR SE OR TE)/ELS (L) (A2 OR B3 OR B4
OR B5 OR B1 OR B2)/PG) NOT ((C OR H OR AC OR N OR SB OR
BI OR O OR PO)/ELS OR (A1 OR LNTH OR ACTN OR SHEL OR B6
OR B7 OR B8 OR A3 OR A4 OR A7 OR A8)/PG)
SAV L17 AND563/A

FILE 'HCA' ENTERED AT 10:04:22 ON 23 MAY 2003

L18 114665 SEA L17
L19 331258 SEA QUANTUM# OR QUANTA#
L20 40537 SEA NANOPARTICL? OR NANOSIZE# OR NANOSIZING# OR NANOSCAL?
OR NANOSPHER? OR (NANO OR NANOMET?) (2A) (PARTICL? OR
SIZE# OR SIZING# OR SCALE# OR SPHER? OR PARTICULAT? OR
POWDER? OR FINES# OR DUST? OR GRIT?)

L21 352839 SEA ATOMIZ? OR ATOMIS? OR MICRONIZ? OR MICRONIS? OR
AEROSOL? OR AERIF? OR AERAT? OR SPRAY? OR MIST OR MISTS
OR MISTED OR MISTING# OR ASPERS? OR ASPERGAT?
L22 40468 SEA ATOMIZ? OR ATOMIS? OR MICRONIZ? OR MICRONIS?
L23 145060 SEA MICROPARTICL? OR MICROSIZE# OR MICROSIZING# OR
MICROSCAL? OR MICROSPHER? OR (MICRON# OR MICROMET? OR UM
OR U(W)M OR MU OR M(W)U OR NM) (2A) (PARTICL? OR SIZE# OR
SIZING# OR SCALE# OR SPHER? OR PARTICULAT? OR POWDER? OR
FINES# OR DUST? OR GRIT?)
L24 41329 SEA FLOCCUL? OR FLOCUL?
L25 7991 SEA L18 AND L19
L26 6 SEA L25 AND L24
L27 42 SEA L25 AND L21
L28 12 SEA L25 AND L22
L29 1714 SEA L18 AND L20
L30 5 SEA L29 AND L24
L31 44 SEA L29 AND L21
L32 6 SEA L29 AND L22
L33 1278 SEA L18 AND L23
L34 4 SEA L33 AND L24
L35 51 SEA L33 AND L21
L36 10 SEA L33 AND L22
L37 89729 SEA ULTRASOUND? OR ULTRASON? OR ULTRA(2A) (SOUND? OR
SONIC? OR SONO?)
L38 1028 SEA L18 AND L37
L39 0 SEA L38 AND L24
L40 23 SEA L38 AND L19
L41 54 SEA L38 AND (L20 OR L23)
L42 31 SEA L38 AND (L21 OR L22)
L43 9 SEA L40 AND L41
L44 1 SEA L40 AND L42
L45 10 SEA L41 AND L42
L46 7 SEA L18 AND L19 AND (L20 OR L23) AND (L21 OR L22)
L47 416744 SEA SEMICOND? OR SEMI(A) (COND# OR CONDUCT?)
L48 QUE 76/SC,SX
L49 44372 SEA L18 AND (L47 OR L48)
L50 56 SEA L49 AND (L19 OR L20 OR L23) AND (L21 OR L22)
L51 7 SEA L49 AND L19 AND (L20 OR L23) AND (L21 OR L22)
L52 8 SEA L49 AND L24
L53 25 SEA L50 AND L19
L54 27 SEA L50 AND L20
L55 10 SEA L50 AND L22
L56 34 SEA L26 OR L30 OR L32 OR L34 OR L43 OR L44 OR L46 OR L51
OR L52
L57 25 SEA (L28 OR L36 OR L45 OR L55) NOT L56
L58 30 SEA (L53 OR L54) NOT (L56 OR L57)
L59 55 SEA (L27 OR L31 OR L35) NOT (L56 OR L57 OR L58)
L60 7 SEA L27 AND L31
L61 1 SEA L27 AND L35
L62 8 SEA L31 AND L35
L63 1 SEA (L60 OR L61 OR L62) NOT (L56 OR L57 OR L58)
L64 31 SEA L58 OR L63

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L56 ANSWER 1 OF 34 HCA COPYRIGHT 2003 ACS

138:343871 Nanoparticulate compositions comprising inorganic cores.

Bosch, William H.; Cooper, Eugene R.; Matijevic, Egon; Ryde, Niels P. (USA). PCT Int. Appl. WO 2003032959 A1 20030424, 82 pp.

DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-US32619 20021015. PRIORITY: US 2001-PV328818 20011015.

AB The invention is directed to nanoparticulate compns. comprising inorg. cores and methods of making and using such compns. The nanoparticulate compns. comprise at least 1 type of org. core having adsorbed or bound to the surface thereof at least 1 type of active mol. The compns. exhibit superior properties as compared to conventional **micronized** and nanoparticulate active agent formulations. Thus, naproxen was coated on alumina **nanoparticles**. There was no evidence of any interaction between naproxen and alumina core surfaces.

IT 1306-23-6, Cadmium sulfide, biological studies

1314-98-3, Zinc sulfide, biological studies

(nanoparticulate compns. comprising inorg. cores)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd==S

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S==Zn

IC ICM A61K009-51

- CC 63-6 (Pharmaceuticals)
Section cross-reference(s): 1, 5, 19, 62
- ST **nanoparticle** inorg core metal oxide
- IT Drug delivery systems
(**nanoparticles**; nanoparticulate compns. comprising inorg. cores)
- IT 69-89-6D, Xanthine, derivs. 1306-19-0, Cadmium oxide, biological studies **1306-23-6**, Cadmium sulfide, biological studies 1314-13-2, Zinc oxide, biological studies **1314-98-3**, Zinc sulfide, biological studies 1317-60-8, Hematite, biological studies 1344-28-1, Alumina, biological studies 1344-70-3, Copper oxide 7440-22-4D, Silver, halides 7631-86-9, Silica, biological studies 7727-43-7, Barium sulfate 9007-12-9, Calcitonin 11104-61-3, Cobalt oxide 11118-57-3, Chromium oxide 11129-18-3, Cerium oxide 12626-43-6, Chromium hydroxide 13463-67-7, Titanium oxide, biological studies
(nanoparticulate compns. comprising inorg. cores)
- L56 ANSWER 2 OF 34 HCA COPYRIGHT 2003 ACS
- 138:293298 Synthesis and Characterization of Cd-DMSO Complex Capped CdS **Nanoparticles**. Wankhede, Manoj E.; Haram, Santosh K. (Department of Chemistry, University of Mumbai, Mumbai, 400098, India). Chemistry of Materials, 15(6), 1296-1301 (English) 2003. CODEN: CMATEX. ISSN: 0897-4756. Publisher: American Chemical Society.
- AB We report here the capping of cadmium sulfide **nanoparticles** (Q-CdS) with a Cd-DMSO complex as a consequence of particle prepn. in DMSO (DMSO). A characteristic sharp peak at 367 nm in the UV-vis for Q-CdS showed a gradual blue shift of ca. 41 nm, indicating the decrease in the particle size with time instead of the expected red shift for **flocculation**. Erosion of the particles was attributed to the reaction of CdS with DMSO to form a Cd-DMSO complex. FTIR spectra recorded for **flocculated** Q-CdS gave major peaks at 617, 800, 1109, 1261, 1408, and 1561 cm⁻¹ which were attributed to the presence of Cd-DMSO complex and acetate ions on the particle surface. The anti-stoke shift of S:O stretching frequency for particle-assocd. DMSO indicated that the bonding is through a sulfur moiety. On the basis of results from thermal and postannealed IR spectral analyses, the formation of a stable Cd-DMSO complex on the particle surface was inferred. The obsd. soln. stability was attributed to the particle surface passivation by the complex. The kinetic studies of the reaction between Q-CdS and DMSO revealed that the reaction is second order with a rate const. of ca. 2 .times. 10⁻⁶ L mol⁻¹ s⁻¹.
- IT **1306-23-6**, Cadmium sulfide, properties
(synthesis and characterization of Cd-DMSO complex capped CdS **nanoparticle**)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 66-6 (Surface Chemistry and Colloids)
Section cross-reference(s): 78
- ST synthesis characterization DMSO complex cadmium sulfide
nanoparticle
- IT Absorption spectra
Differential thermal analysis
IR spectra
Thermogravimetric analysis
X-ray diffraction
(Cd-DMSO complex capped CdS **nanoparticle** studied using)
- IT Microstructure
(TEM images; Cd-DMSO complex capped CdS **nanoparticle**
studied using)
- IT **Nanoparticles**
(synthesis and characterization of Cd-DMSO complex capped CdS
nanoparticle)
- IT Reaction kinetics
(synthesize of Cd-DMSO complex capped CdS **nanoparticle**
studied using)
- IT 1306-23-6, Cadmium sulfide, properties
(synthesis and characterization of Cd-DMSO complex capped CdS
nanoparticle)
- IT 67-68-5, Dimethyl sulfoxide, processes
(to synthesize Cd-DMSO complex capped CdS **nanoparticle**)
- IT 543-90-8, Cadmium acetate 1313-82-2, Sodium sulfide, processes
(to synthesize CdS **nanoparticle**)

L56 ANSWER 3 OF 34 HCA COPYRIGHT 2003 ACS

138:128366 Optical response of dendrimer-encapsulated CdS
quantum dots - regulation of interparticle electronic
coupling. Richardson, Douglas D.; Ely, S. Ryland; McMurdo, Meredith
J.; Van Patten, P. Gregory (Department of Chemistry and
Biochemistry, Ohio University, Athens, OH, 45701-2979, USA).
Materials Research Society Symposium Proceedings,
726 (Organic/Inorganic Hybrid Materials--2002), 343-348 (English)
2002. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials
Research Society.

AB Optical properties of metal and **semiconductor**
nanoparticles are sensitively dependent upon electronic
coupling between the individual particles. In another work, the
authors demonstrated the ability to regulate inter-particle
electronic coupling between metal **nanoparticles** based on
the soln.-phase properties of the dendrimers used to encapsulate and
stabilize the particles. Here, the authors attempt to apply the
knowledge derived in those studies of metal **nanoparticles**
to understand the optical response obsd. in dendrimer-stabilized CdS
quantum dots. Absorption and photoluminescence measurements
were combined with TEM to det. if dendrimer-related aggregation
phenomena affect optical response in these systems.
Dendrimer-stabilized CdS **nanoparticles** exhibit quite
different aggregation behavior from the analogous metal

nanoparticles. In direct contrast to the metal systems, the dendrimer-stabilized CdS **nanoparticles** tend to **flocculate** at low pH and are most stable at high pH. The degree of protection offered at high pH is dependent on the terminal functional groups of the dendrimer. Carboxylated dendrimers give higher protection than aminated dendrimers and yield significantly higher luminescence efficiencies. The results challenge the authors' prior conclusions regarding aggregation mechanisms in dendrimer nanocomposites and will provide important insight for future efforts to incorporate these **nanoparticles** into photovoltaic or luminescent devices.

IT 1306-23-6, Cadmium sulfide (CdS), properties
(optical response of dendrimer-encapsulated CdS **quantum**
dots and regulation of interparticle electronic coupling)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST dendrimer encapsulated cadmium sulfide **quantum** dot
interparticle electronic coupling; **flocculation**
agglomeration PAMAM optoelectronic device

IT Agglomeration
Flocculation

Luminescence

Quantum dot devices

UV and visible spectra

(optical response of dendrimer-encapsulated CdS **quantum**
dots and regulation of interparticle electronic coupling)

IT 26937-01-9, PAMAM
(dendritic; optical response of dendrimer-encapsulated CdS
quantum dots and regulation of interparticle electronic
coupling)

IT 1306-23-6, Cadmium sulfide (CdS), properties
(optical response of dendrimer-encapsulated CdS **quantum**
dots and regulation of interparticle electronic coupling)

L56 ANSWER 4 OF 34 HCA COPYRIGHT 2003 ACS

137:56411 Template-based synthesis of **nanoscale** Ag₂E (E = S, Se) dendrites. Xiao, Jianping; Xie, Yi; Tang, Rui; Luo, Wei (Structure Research Laboratory, and Lab of Nanochemistry & Nanomaterials, University of Science and Technology of China, Hefei, Anhui, 230026, Peop. Rep. China). Journal of Materials Chemistry, 12(4), 1148-1151 (English) 2002. CODEN: JMACEP. ISSN: 0959-9428. Publisher: Royal Society of Chemistry.

AB Well-defined **nanoscale** Ag₂S and Ag₂Se dendrites, which represent a novel morphol. of silver chalcogenides, were successfully synthesized by using a template-based method at room temp. and ambient pressure. The template and **ultrasonic**

wave played important roles in the formation of well-defined dendrites. The products were characterized by x-ray diffraction, TEM, XPS and elemental anal. The optical properties of the products were also recorded by using UV-visible absorption spectroscopy which indicated the products were within a **quantum** confinement region. The formation mechanism of dendrites was also investigated.

IT 1302-09-6P, Silver selenide (Ag₂Se) 21548-73-2P,
Silver sulfide (Ag₂S)
(template-based synthesis of **nanoscale** Ag₂S and Ag₂Se
dendrites)
RN 1302-09-6 HCA
CN Silver selenide (Ag₂Se) (6CI, 8CI, 9CI) (CA INDEX NAME)

Ag-Se-Ag

RN 21548-73-2 HCA
CN Silver sulfide (Ag₂S) (8CI, 9CI) (CA INDEX NAME)

Ag-S-Ag

CC 78-5 (Inorganic Chemicals and Reactions)
ST silver sulfide selenide dendrite **nanoscale** synthesis
IT Dendrites (crystal)
(template-based synthesis of **nanoscale** Ag₂S and Ag₂Se
dendrites)
IT 1302-09-6P, Silver selenide (Ag₂Se) 21548-73-2P,
Silver sulfide (Ag₂S)
(template-based synthesis of **nanoscale** Ag₂S and Ag₂Se
dendrites)

L56 ANSWER 5 OF 34 HCA COPYRIGHT 2003 ACS
134:170199 Size tailoring of CdS **nanoparticles** by different
colloidal chemical techniques. Foglia, S.; Suber, L.; Righini, M.
(ICMAT-CNR, Rome, 00016, Italy). Colloids and Surfaces, A:
Physicochemical and Engineering Aspects, 177(1), 3-12 (English)
2001. CODEN: CPEAEH. ISSN: 0927-7757. Publisher: Elsevier Science
B.V..

AB Three different synthetic routes were used for the prepn. of CdS
nanoparticles and the samples were characterized
structurally and optically. Sample compn., dimension and
quantum confinement excitations are discussed and compared.
Sharp edges present in the absorbance spectra indicated that these
systems are promising for optoelectronic and photonic device
applications.

IT 1306-23-6P, Cadmium sulfide, properties
(size tailoring of CdS **nanoparticles** by different
colloidal chem. techniques)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 66

ST size tailoring cadmium sulfide **nanoparticle** colloidal technique

IT Sound and **Ultrasound**

(in prepn.; size tailoring of CdS **nanoparticles** by different colloidal chem. techniques)

IT Band gap

Luminescence

Nanoparticles

Sol-gel processing

Surface structure

UV and visible spectra

(size tailoring of CdS **nanoparticles** by different colloidal chem. techniques)

IT 67-64-1, Acetone, uses

(size tailoring of CdS **nanoparticles** by different colloidal chem. techniques)

IT 1306-23-6P, Cadmium sulfide, properties

(size tailoring of CdS **nanoparticles** by different colloidal chem. techniques)

IT 79-42-5, 2-Mercaptopropionic acid 121-44-8, Triethylamine,

reactions 371-42-6, 4-Fluorothiophenol 577-11-7, AOT

1191-43-1, 1,6-Hexanedithiol 7601-54-9, Sodium phosphate

10108-64-2, Cadmium chloride 10124-36-4, Cadmium sulfate

10325-94-7, Cadmium nitrate

(size tailoring of CdS **nanoparticles** by different colloidal chem. techniques)

L56 ANSWER 6 OF 34 HCA COPYRIGHT 2003 ACS

132:243413 Optical properties of CdS **quantum** dots: the key role of the spin-orbit and coulomb interactions. Chamarro, M.; Voliotis, V.; Dib, M.; Gacoin, T.; Delerue, C.; Allan, G.; Lannoo, M. (GPS Universites Paris VI-VII and Universite d'Evry val d'Essonne, Fr.). Materials Research Society Symposium Proceedings, 571 (Semiconductor Quantum Dots), 57-68 (English) 2000. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB The authors study theor. and exptl. the effects of the Coulomb and the spin-orbit coupling on the electronic structure of small **quantum** dots. A tight-binding calcn. with restricted CI is developed in a typical case: very small cubic **quantum** dots for which the electron-hole exchange interaction is of the order of magnitude of the spin-orbit interaction. Exptl., resonant photoluminescence and photoluminescence excitation are used to obtain information on a single size of CdS **quantum** dot obtained by a chem. growth method.

IT 1306-23-6P, Cadmium sulfide (CdS), properties

(optical properties of CdS **quantum** dots: key role of

spin-orbit and coulomb interactions)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- ST cadmium sulfide nanocrystal electronic spectra spin orbit Coulomb interaction; visible spectra cadmium sulfide nanocrystal spin orbit Coulomb interaction; resonance luminescence cadmium sulfide nanocrystal spin orbit Coulomb interaction; fine structure exciton cadmium sulfide nanocrystal electronic spectra; sol gel cadmium sulfide nanocrystal electronic spectra; reverse micelle cadmium sulfide nanocrystal electronic spectra; band gap exciton cadmium sulfide nanocrystal electronic spectra; Hamiltonian cadmium sulfide nanocrystal electronic spectra; **quantum** dot cadmium sulfide electronic spectra spin orbit Coulomb; size cadmium sulfide nanocrystal electronic spectra spin orbit Coulomb; colloid cadmium sulfide nanocrystal electronic spectra spin orbit Coulomb; exchange interaction cadmium sulfide nanocrystal electronic spectra; **flocculation** cadmium sulfide nanocrystal electronic spectra spin orbit Coulomb
- IT Band gap
Colloids
Electronic structure
Electrostatic field
Exchange interaction
Exciton
Fine structure (energy level)
Flocculation
Hamiltonian
Luminescence
Nanocrystals
Particle size
Quantum dot devices
Quantum size effect
Resonance fluorescence
Sol-gel processing
Spin-orbit coupling
UV and visible spectra
(optical properties of CdS **quantum** dots: key role of spin-orbit and coulomb interactions)
- IT Silica gel, properties
(optical properties of CdS **quantum** dots: key role of spin-orbit and coulomb interactions)
- IT Micelles
(reverse; optical properties of CdS **quantum** dots: key role of spin-orbit and coulomb interactions)
- IT 577-11-7, AOT 4420-74-0
(optical properties of CdS **quantum** dots: key role of

- spin-orbit and coulomb interactions)
- IT 1306-23-6P, Cadmium sulfide (CdS), properties
(optical properties of CdS **quantum** dots: key role of
spin-orbit and coulomb interactions)
- L56 ANSWER 7 OF 34 HCA COPYRIGHT 2003 ACS
- 132:57541 CdS nanocrystal/chelate polymer hybrid systems: controls of
optical and morphological properties by monochromatic
photoirradiation. Yao, Hiroshi; Takada, Yukako; Ito, Ayumu;
Kitamura, Noboru (Division of Chemistry, Graduate School of Science,
Hokkaido University, Sapporo, 060-0810, Japan). Polymer Journal
(Tokyo), 31(11-2), 1133-1138 (English) 1999. CODEN: POLJB8. ISSN:
0032-3896. Publisher: Society of Polymer Science, Japan.
- AB Photo-controlled synthesis of CdS nanocrystal/polymer hybrids was
accomplished by in situ reaction between Cd²⁺ and S²⁻ in chelate
polymer **microparticles** under monochromatic photoirradn.
The host matrix used is styrene-divinylbenzene copolymer chelating
resin [Chelex 100]. The hybrids were characterized by absorption
micro-spectroscopy, optical microscopy and TEM. In the presence of
oxygen, photoirradn. on the reaction mixt. resulted in photodissoln.
of CdS and this also rendered photoflocculation of the crystals in
the polymer. The morphol. of the nanocrystal in a polymer host with
a layer-by-layer dispersion structure can be controlled by an
appropriate choice of irradiation conditions. In the presence of an
electrolyte (i.e., NaCl) during hybrid formation,
flocculation of CdS was suppressed. The spectrum
responsible for photodissolved CdS exhibited a prominent peak at
around 468 nm. The mechanism of hybrid formation is based on
competition between formation and photodissoln. of the CdS
nanocrystals.
- IT 1306-23-6P, Cadmium sulfide (CdS), properties
(monochromatic photoirradn. in controlled formation of CdS
nanocrystals in chelating resin to obtain hybrid systems)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 76-2 (Electric Phenomena)
Section cross-reference(s): 38
- ST styrene divinylbenzene copolymer chelating resin hybrid cadmium
sulfide; nanocrystal cadmium sulfide polymer hybrid prepn
photodissocn; **semiconductor** nanocrystal cadmium sulfide
hybrid photoinduced prepn
- IT Chelating agents
Dispersion (of materials)
Hybrid organic-inorganic materials
Ion exchangers
Nanocrystals
Semiconductor materials
UV absorption

(monochromatic photoirradn. in controlled formation of CdS nanocrystals in chelating resin to obtain hybrid systems)

IT 1306-23-6P, Cadmium sulfide (CdS); properties
(monochromatic photoirradn. in controlled formation of CdS nanocrystals in chelating resin to obtain hybrid systems)

L56 ANSWER 8 OF 34 HCA COPYRIGHT 2003 ACS

131:343441 Pulsed Sonoelectrochemical Synthesis of Cadmium Selenide **Nanoparticles**. Mastai, Y.; Polsky, R.; Koltypin, Yu.; Gedanken, A.; Hodes, G. (Department of Materials and Interfaces, The Weizmann Institute of Science, Rehovot, 76100, Israel). Journal of the American Chemical Society, 121(43), 10047-10052 (English) 1999. CODEN: JACSAT. ISSN: 0002-7863. Publisher: American Chemical Society.

AB Powders of CdSe **nanoparticles** were prep'd. by a pulsed sonoelectrochem. technique. The crystal size could be varied from x-ray amorphous up to 9 nm (sphalerite phase) by controlling the various electrodeposition and sonic parameters. The mechanisms for the effects of the various parameters on particle size are discussed. Optical properties of the powders were measured by diffuse reflection spectroscopy and the measured increase in band gap due to size quantization correlated with particle size.

IT 1306-24-7P, Cadmium selenide, properties
(pulsed sonoelectrochem. synthesis of cadmium selenide **nanoparticles**)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 72-4 (Electrochemistry)

Section cross-reference(s): 73, 76

ST sonoelectrochem synthesis cadmium selenide **nanoparticle**;
crystal size electrodeposition deposition **nanoparticle**

IT **Powders**

(**nano-**; pulsed sonoelectrochem. synthesis of cadmium selenide **nanoparticles**)

IT Band gap

Electrodeposition

Nanoparticles

Optical reflection

Particle size

Quantum size effect

Sound and **Ultrasound**

(pulsed sonoelectrochem. synthesis of cadmium selenide **nanoparticles**)

IT 1306-24-7P, Cadmium selenide, properties

(pulsed sonoelectrochem. synthesis of cadmium selenide **nanoparticles**)

IT 10108-64-2, Cadmium chloride 10124-36-4, Cadmium sulfate
25468-09-1 25817-24-7, Potassium nitrilotriacetate

(pulsed sonoelectrochem. synthesis of cadmium selenide
nanoparticles)

L56 ANSWER 9 OF 34 HCA COPYRIGHT 2003 ACS

131:94108 Characterization of ZnSe **nanoparticles** prepared using **ultrasonic** radiation method. Xu, Jianfeng; Ji, Wei; Tang, Sing-Hai; Huang, Wei (Department of Physics, National University of Singapore, Singapore, 119260, Singapore). Materials Research Society Symposium Proceedings, 536 (Microcrystalline and Nanocrystalline Semiconductors--1998), 401-405 (English) 1999. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB ZnSe **nanoparticles** with an av. size of 15 nm were prepd. using the **ultrasonic** radiation method. The characterization was carried out by XRD, TEM, XPS and Raman scattering spectroscopy. The as-prepd. powders are composed of ZnSe with Zn-blende structure. The high purity of ZnSe particles was confirmed by XPS anal. In the Raman spectra, TO and LO phonon modes were obsd. at 205 and 257 cm⁻¹ in the ZnSe **nanoparticles**.

IT 1315-09-9P, Zinc selenide
(characterization of zinc selenide **nanoparticles** prepd. using **ultrasonic** radiation method by XPS, TEM, and Raman spectra)

RN 1315-09-9 HCA

CN Zinc selenide (ZnSe) (9CI) (CA INDEX NAME)

Se—Zn

CC 73-3 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 78

ST zinc selenide **nanoparticle** prepn **ultrasound** XPS
Raman TEM phonon

IT LO phonon
Nanocrystals
Particle size
Phonon
Quantum dot devices
Raman spectra
Sound and **Ultrasound**
Transmission electron microscopy
X-ray photoelectron spectra

(characterization of zinc selenide **nanoparticles** prepd. using **ultrasonic** radiation method by XPS, TEM, and Raman spectra)

IT 1315-09-9P, Zinc selenide
(characterization of zinc selenide **nanoparticles** prepd. using **ultrasonic** radiation method by XPS, TEM, and Raman spectra)

IT 1313-85-5, Disodium selenide 7440-66-6, Zinc, reactions

(characterization of zinc selenide **nanoparticles** prepd. using **ultrasonic** radiation method by XPS, TEM, and Raman spectra)

L56 ANSWER 10 OF 34 HCA COPYRIGHT 2003 ACS

130:285581 Surface synthesis of zinc sulfide **nanoparticles** on silica **microspheres**: Sonochemical preparation, characterization, and optical properties. Dhas, N. Arul; Zaban, A.; Gedanken, A. (Department of Chemistry, Bar-Ilan University, Ramat-Gan, 52900, Israel). Chemistry of Materials, 11(3), 806-813 (English) 1999. CODEN: CMATEX. ISSN: 0897-4756. Publisher: American Chemical Society.

AB **Ultrasonic** irradiation of a slurry of amorphous silica **microspheres**, zinc acetate, and thioacetamide in an aqueous medium for 3 h under ambient air yields zinc sulfide coated on silica. The powder X-ray diffraction of the initial zinc sulfide-silica (ZSS) powder yields diffraction peaks corresponding to the ZnS phase. The TEM image of ZSS shows that the porous ZnS **nanoparticles** (diam. 1-5 nm) coated the silica (SiO₂) surface as thin layers or nanoclusters, depending on the reactant concentration. IR spectroscopy illustrates the structural changes that occurred in the siloxane network and surface silanol groups of SiO₂ upon the **ultrasonic** deposition of ZnS. The optical absorption of porous ZnS shows a broad band at around 610 nm, ascribed to unusual surface state transition. The absorption energy of the surface state transition is lower than the band gap of the ZnS particles and probably stems from the dangling surface bonds or defects. On the other hand, the ZSS does not show the surface state transition of ZnS, probably due to the strong surface interaction with SiO₂. The classical valence-conduction transition band has been observed in the optical reflectance mode, and it shows an absorption edge at around (290-310 nm), which is markedly blue-shifted compared to that of bulk ZnS (345 nm). The photoluminescence spectrum of the porous ZnS and ZSS shows a band with a maximum centered around 420 nm, which is similar to that of **quantum** ZnS particles. We propose that the coating process takes place via **ultrasonic**-cavitation-induced initial grafting of zinc acetate onto the silica surface, followed by the displacement of acetate ion by in-situ generated S²⁻ species.

IT 1314-98-3P, Zinc sulfide (ZnS), preparation
(**nanoparticles**; sonochem. prepn. and characterization
and optical properties of surface-synthesized zinc sulfide
nanoparticles on silica **microspheres**)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 57-2 (Ceramics)

Section cross-reference(s): 73

ST thioacetamide zinc acetate sonochem reaction zinc sulfide coating;

sonochem surface synthesis zinc sulfide **nanoparticle**
silica **microsphere**

- IT Powders
(ceramic, zinc sulfide-coated silica; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT Band gap
(optical; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT Ceramics
(powders, zinc sulfide-coated silica; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT **Microspheres**
(silica; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT Luminescence
Optical absorption
Optical absorption edge
Optical reflection
Sound and **Ultrasound**
(sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT Coating process
(sonochem.; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT **Nanoparticles**
(zinc sulfide; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT 7631-86-9P, Silica, preparation
(**microspheres**; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT 1314-98-3P, Zinc sulfide (ZnS), preparation
(**nanoparticles**; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)
- IT 62-55-5, Thioacetamide 557-34-6, Zinc acetate
(reactant; sonochem. prepn. and characterization and optical properties of surface-synthesized zinc sulfide **nanoparticles** on silica **microspheres**)

L56 ANSWER 11 OF 34 HCA COPYRIGHT 2003 ACS

130:102547 Hybrid gels and **nanoscale** chemistry for optical applications. Boilot, J.-P.; Biteau, J.; Brun, A.; Chaput, F.; De

Morais, T. Dantas; Darracq, B.; Gacoin, T.; Lahlil, K.; Lehn, J-M.; Levy, Y.; Malier, L.; Tsivgoulis, G-M. (Laboratoire de Physique de la Matiere Condensee, CNRS UMR 7643, Ecole Polytechnique, Palaiseau, 91128, Fr.). Materials Research Society Symposium Proceedings, 519 (Organic/Inorganic Hybrid Materials), 227-238 (English) 1998. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

- AB A large variety of materials for optical and optoelectronic applications was developed by trapping active org. mols. and nanocrystals into pure inorg. and hybrid org.-inorg. gels. Concerning optically active mols., we focus only here on luminescent materials for solid state tunable lasers and light-emitting diodes, and photochromic materials for integrated optics and optical storage. Optical properties can be controlled by changing the nature and the intensity of chem. and steric interactions between the org. system and the solid host matrix. Concerning nanocrystals, we present two approaches for the synthesis of transparent solids based on II-VI **semiconducting nanoparticles**. A first category of materials consists in the dispersion of CdS **nanoparticles** in sol-gel silica matrixes. The luminescence can be controlled by offering an alternative pathway for the recombination of surface trapped carriers. A second group of transparent materials was obtained by considering the CdS **nanoparticles** not only as the optically active units, but also as the building blocks for the whole solid.
- IT 1306-23-6, Cadmium sulfide (CdS), properties
(transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd==S

- CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 66
- ST hybrid gel **nanoscale** chem optical; sol gel laser light emitting diode optical waveguide; cadmium sulfide **nanoparticle** sol gel silica luminescence; pyrromethene sol gel laser; thienylethene photochromic sol gel
- IT Luminescence
Luminescent substances
Nanoparticles
(silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- IT Colloids
(silica sol-gel films contg. cadmium sulfide **nanoparticles**, via colloid chem.)
- IT Xerogels
(solid-state lasers and luminescent **nanoparticle** dispersed films)

- IT Sol-gel processing
(solid-state lasers, light-emitting diodes, photochromic films, laser-written waveguides, and luminescent **nanoparticle** dispersed films)
- IT 371-42-6, 4-Fluorophenylthiol
(complexing agent; transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- IT 4420-74-0
(**flocculation** preventer; transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- IT 7631-86-9, Silica, properties
(transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- IT 1306-23-6, Cadmium sulfide (CdS), properties
(transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- IT 78-10-4, Tetraethoxysilane
(transparent silica sol-gel films contg. cadmium sulfide **nanoparticles**)
- L56 ANSWER 12 OF 34 HCA COPYRIGHT 2003 ACS
- 129:218612 Aerosol method and ultrasonic **atomizer** for making particles and powders. Hampden-Smith, Mark J.; Kodas, Toivo T.; Powell, Quint H.; Skamser, Daniel J.; Caruso, James; Chandler, Clive D. (Nanochem Research, LLC, USA). PCT Int. Appl. WO 9836887 A1 19980827, 74 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-US3621 19980224. PRIORITY: US 1997-39450 19970224.
- AB Powd. products, e.g., metal/ceramic particulate composites, are prepd. by an aerosol method, involving the use of an ultrasonic aerosol generator having a plurality of ultrasonic transducers energizing a reservoir of liq. feed for droplet formation. Carrier gas (e.g., air, N₂, H₂) is delivered to different portions of the reservoir by a plurality of gas ports connected to a gas delivery system. The aerosol is pyrolyzed to form particles, which are cooled and collected.
- IT 1314-96-1P, Strontium sulfide 1314-98-3P, Zinc sulfide, processes 12032-36-9P, Magnesium sulfide 20548-54-3P, Calcium sulfide 21109-95-5P, Barium sulfide 82992-94-7P, Calcium strontium sulfide (CaSr)S 120558-00-1P, Magnesium strontium sulfide (MgSr)S
(particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- RN 1314-96-1 HCA
- CN Strontium sulfide (SrS) (9CI) (CA INDEX NAME)

S==Sr

RN 1314-98-3 HCA
 CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S==Zn

RN 12032-36-9 HCA
 CN Magnesium sulfide (MgS) (6CI, 8CI, 9CI) (CA INDEX NAME)

Mg==S

RN 20548-54-3 HCA
 CN Calcium sulfide (CaS) (9CI) (CA INDEX NAME)

Ca==S

RN 21109-95-5 HCA
 CN Barium sulfide (BaS) (7CI, 9CI) (CA INDEX NAME)

Ba==S

RN 82992-94-7 HCA
 CN Calcium strontium sulfide ((Ca,Sr)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Ca	0 - 1	7440-70-2
Sr	0 - 1	7440-24-6

RN 120558-00-1 HCA
 CN Magnesium strontium sulfide ((Mg,Sr)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Sr	0 - 1	7440-24-6
Mg	0 - 1	7439-95-4

IC ICM B29B009-00
 CC 48-3 (Unit Operations and Processes)
 Section cross-reference(s): 56, 57, 74, 76
 ST particle formation aerosol ultrasound **atomizer**; powder
 formation aerosol ultrasound **atomizer**; spray pyrolysis

- ultrasound **atomizer** particle formation
- IT Air
 - (carrier gas; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Vapor deposition process
 - (chem.; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Aerosols
 - Atomizing** (spraying)
 - Ceramics
 - Microparticles
 - Nanoparticles**
 - Particles
 - Phosphors
 - Powders
 - Ultrasonic transducers
 - (particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Alloys, processes
- Metals, processes
- Oxides (inorganic), processes
 - (particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Composites
 - (particulate; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Vapor deposition process
 - (phys.; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Particles
 - (spherical; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Calcination
 - (spray; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT Spray **atomizers**
 - (ultrasonic; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT 1333-74-0, Hydrogen, uses 7727-37-9, Nitrogen, uses
 - (carrier gas; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT 7440-53-1, Europium, uses
 - (dopant; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT 1314-36-9P, Yttria, processes
 - (europium-doped; particle and powder manuf. from aerosols using ultrasonic **atomizer**)
- IT 1309-37-1P, Ferric oxide, processes 1309-48-4P, Magnesia, processes 1314-13-2P, Zinc oxide, processes 1314-23-4P, Zirconia, processes **1314-96-1P**, Strontium sulfide **1314-98-3P**, Zinc sulfide, processes 1317-36-8P, Lead monoxide, processes 1344-28-1P, Alumina, processes 7439-92-1P,

Lead, processes 7440-02-0P, Nickel, processes 7440-05-3P,
 Palladium, processes 7440-06-4P, Platinum, processes 7440-22-4P,
 Silver, processes 7440-50-8P, Copper, processes 7440-57-5P,
 Gold, processes 7631-86-9P, Silica, processes 11099-34-6P
 11101-29-4P 11101-35-2P 12032-30-3P, Magnesium titanate
12032-36-9P, Magnesium sulfide 12036-10-1P, Ruthenium
 oxide (RuO₂) 12047-27-7P, Barium titanate, processes
 12049-50-2P, Calcium titanate 12060-00-3P, Lead titanate
 12060-59-2P, Strontium titanate 12669-05-5P 13463-67-7P,
 Titania, processes **20548-54-3P**, Calcium sulfide
21109-95-5P, Barium sulfide 37197-23-2P 39407-01-7P,
 Neodymium titanate 54741-94-5P **82992-94-7P**, Calcium
 strontium sulfide (CaSr)S **120558-00-1P**, Magnesium
 strontium sulfide (MgSr)S 148158-30-9P, Bismuth ruthenium oxide
 Bi₂Ru₂O₇.3

(particle and powder manuf. from aerosols using ultrasonic
atomizer)

L56 ANSWER 13 OF 34 HCA COPYRIGHT 2003 ACS

129:89351 Nanocomposite materials prepared by using **quantum**
 dots as building blocks. Nedeljkovic, J. M.; Dimitrijevic, N. M.;
 Comor, M. I.; Saponjic, Z. V.; Uskokovic, D. P. (Vinca Institute
 Nuclear Sciences, Belgrade, Yugoslavia). Materials Science Forum,
 282-283 (Advanced Materials and Processes), 19-26 (English) 1998.
 CODEN: MSFOEP. ISSN: 0255-5476. Publisher: Trans Tech Publications
 Ltd..

AB Two synthetic procedures for prepn. of composite materials by
semiconductor quantum dots as building blocks were
 developed. The resulting powders preserved optical and
 photocatalytic properties of their constituent elements. Both
 procedures are not limited to **semiconductor**
quantum dots, but provide general procedures for the
 rational design of novel and useful composite materials. The 1st
 approach is based on destabilization of the colloidal dispersion
 consisting of CdS/SiO₂ composite particles. The 2nd method used
ultrasonic spray pyrolysis and TiO₂
quantum dots as building blocks leading to the formation of
 submicron TiO₂ spheres with preserved optical and photocatalytic
 properties. The synthesis can be carried out using
nanospheres of different materials and radii as for Pt-doped
quantum-TiO₂ powder.

IT **1306-23-6**, Cadmium sulfide, properties
 (CdS/SiO₂ nanocomposites built of CdS **quantum** dots
 prepd. by destabilization of colloidal dispersions maintaining
 the absorption spectra of CdS)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 78-5 (Inorganic Chemicals and Reactions)

- ST cadmium sulfide **quantum** dot silica nanocomposite;
colloidal dispersion cadmium sulfide silica nanocomposite; titania
nanocomposite **quantum** dot photocatalytic property;
spray pyrolysis titania **quantum** dot nanocomposite
- IT Nanocomposites
 Nanoparticles
 UV and visible spectra
 (CdS/SiO₂ and TiO₂ nanocomposites built of CdS or TiO₂
 quantum dots maintaining their optical properties)
- IT Colloids
 (CdS/SiO₂ nanocomposites built of CdS **quantum** dots
 prepd. by destabilization of colloidal dispersions maintaining
 the absorption spectra of CdS)
- IT Catalysts
 (photochem.; TiO₂ nanocomposites built of TiO₂ **quantum**
 dots prepd. by **spray** pyrolysis maintaining the
 absorption spectra and photocatalytic properties of TiO₂)
- IT Calcination
 (**spray**; TiO₂ nanocomposites built of TiO₂
 quantum dots prepd. by **spray** pyrolysis
 maintaining the absorption spectra and photocatalytic properties
 of TiO₂)
- IT 1306-23-6, Cadmium sulfide, properties 7631-86-9, Silica,
properties
 (CdS/SiO₂ nanocomposites built of CdS **quantum** dots
 prepd. by destabilization of colloidal dispersions maintaining
 the absorption spectra of CdS)
- IT 13463-67-7, Titania, properties
 (TiO₂ nanocomposites built of TiO₂ **quantum** dots prepd.
 by **spray** pyrolysis maintaining the absorption spectra
 and photocatalytic properties of TiO₂)
- L56 ANSWER 14 OF 34 HCA COPYRIGHT 2003 ACS
- 129:34606 A sonochemical approach to the surface synthesis of cadmium
sulfide **nanoparticles** on submicron silica. Arul Dhas, N.;
Gedanken, A. (Department of Chemistry, Bar-Ilan University,
Ramat-Gan, 52900, Israel). Applied Physics Letters, 72(20),
2514-2516. (English) 1998. CODEN: APPLAB. ISSN: 0003-6951.
Publisher: American Institute of Physics.
- AB A sonochem. procedure for the prepn. of Cd sulfide (CdS)
nanoparticles coated on submicron spherical SiO₂ particles
was described. **Ultrasonic** irradiation of a slurry of SiO₂
microspheres, Cd sulfate, and thiourea in an aq. medium for
3 h under ambient air yields Cd sulfide-SiO₂ (CSS) composite.
Heating the initial amorphous CSS nanocomposite at 150.degree. for 1
h under a N₂ atmosphere yields diffraction peaks assignable to the
CdS phase. The TEM image of CSS shows that the CdS
nanoparticles homogeneously coated on the SiO₂ (SiO₂)
carrier. The IR spectroscopy illustrated the structural changes
that occur when the amorphous SiO₂ is coated with CdS
nanoparticles ultrasonically. The
photoluminescence spectrum of the CdS and CSS shows a broadband with

a max. centered around 560 nm, which is similar to that of **quantum** CdS particles. The sharp onset of a CSS emission band compared to that of the CdS emission band in the red region indicates that the SiO₂ carrier provides a medium for controlling the aggregation of CdS **nanoparticles**.

IT 1306-23-6, Cadmium sulfide (CdS), properties
(sonochem. approach to surface synthesis of cadmium sulfide **nanoparticles** on submicron silica)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 75-1 (Crystallography and Liquid Crystals)
Section cross-reference(s): 73, 78
ST sonochem synthesis cadmium sulfide **nanoparticle** silica
IT Aggregation
IR spectroscopy
Luminescence
Microspheres
Nanoparticles
(sonochem. approach to surface synthesis of cadmium sulfide **nanoparticles** on submicron silica)
IT 1306-23-6, Cadmium sulfide (CdS), properties 7631-86-9,
Silica, properties 60676-86-0, Vitreous silica
(sonochem. approach to surface synthesis of cadmium sulfide **nanoparticles** on submicron silica)

L56 ANSWER 15 OF 34 HCA COPYRIGHT 2003 ACS
129:21340 Subpicosecond studies of primary photochemical events of CdS particles with surface modified by various capping agents. Uchihara, Toshio; Oshiro, Hisashi; Kinjo, Akio (Dep. Chem., Biol., Mar. Sci., Univ. Ryukyus, Okinawa, 903-0213, Japan). Journal of Photochemistry and Photobiology, A: Chemistry, 114(3), 227-234 (English) 1998. CODEN: JPPCEJ. ISSN: 1010-6030. Publisher: Elsevier Science S.A..

AB Q-CdS particles with surface modified by thiophenol (PhS) or 2-mercaptobenzoxazole (MBO) were prepd. and their time-resolved transient absorption spectra were measured in acetonitrile in subpicosecond to picosecond time domain in order to investigate the influences of capping agents on primary photochem. events such as electron and hole trapping processes and decay kinetics of the trapped charge carriers on capped **semiconductor** Q-particles. In addn., time-resolved transient absorption spectra of aq. CdS colloidal solns. contg. sodium hexametaphosphate (HMP) as a stabilizer against **flocculation** were also measured in the same time domain and compared to obtain knowledge about the trap sites for electrons photoproduced on capped CdS particles in acetonitrile. The shape and the decay profile of transient absorption spectra obtained by subpicosecond laser flash photolysis of PhS-CdS and MBO-CdS in acetonitrile are markedly different from

those of non-capped CdS particles in acetonitrile obtained previously using picosecond laser flash photolysis by Kamat et al. The results suggest that capping agents such as PhS and MBO influence significantly hole trapping process and decay dynamics of the trapped charge carriers on the capped CdS. Furthermore, it seems that the trap site of the electrons generated by laser excitation of PhS-CdS or MBO-CdS in acetonitrile is mainly at the interface of particle-soln. and the possibility for the prodn. of solvated electrons is low because the shapes and decay kinetics of the transient absorption spectra of PhS-CdS or MBO-CdS in acetonitrile are clearly different from those HMP-CdS in water in which the photo-prodn. of the hydrated electrons is known.

IT 1306-23-6, Cadmium sulfide, processes
 (subpicosecond studies of primary photochem. events of CdS particles surface modified by various capping agents)
 RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

IT Electron traps
 Flash photolysis
 Hole traps

Quantum size effect

Semiconductor materials

(subpicosecond studies of primary photochem. events of CdS particles surface modified by various capping agents)

IT 108-98-5, Thiophenol, processes 1306-23-6, Cadmium sulfide, processes 2382-96-9, 2-Mercaptobenzoxazole
 (subpicosecond studies of primary photochem. events of CdS particles surface modified by various capping agents)

L56 ANSWER 16 OF 34 HCA COPYRIGHT 2003 ACS

129:8765 Applicability of the k.cntdot.p method to the electronic structure of **quantum** dots. Fu, Huaxiang; Wang, Lin-Wang; Zunger, Alex (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Physical Review B: Condensed Matter and Materials Physics, 57(16), 9971-9987 (English) 1998. CODEN: PRBMDO. ISSN: 0163-1829. Publisher: American Physical Society.

AB The k.cntdot.p method has become the "std. model" for describing the electronic structure of **nanometer-size quantum** dots. In this paper we perform parallel k.cntdot.p (6 .times. 6 and 8 .times. 8) and direct-diagonalization pseudopotential studies on spherical **quantum** dots of an ionic material (CdSe), and a covalent material (InP). By using an equiv. input in both approaches, i.e., starting from a given at. pseudopotential and deriving from it the Luttinger parameters in k.cntdot.p calcn., we investigate the effect of the different underlying wave-function representations used in k.cntdot.p and in

the more exact pseudopotential direct diagonalization. We find that (i) the 6 .times. 6 k.cntdot.p envelope function has a distinct (odd or even) parity, while **atomistic** wave function is parity-mixed. The 6 .times. 6 k.cntdot.p approach produces an incorrect order of the highest valence states for both InP and CdSe dots: the p-like level is above the s-like level; (ii) it fails to reveal that the second conduction state in small InP dots is folded from the L point in the Brillouin zone. Instead, all states in k.cntdot.p are described as .GAMMA.-like; (iii) the k.cntdot.p overestimates the confinement energies of both valence states and conduction states. A wave-function projection anal. shows that the principal reasons for these k.cntdot.p errors in dots are (a) use of restricted basis set, and (b) incorrect bulk dispersion relation. Error (a) can be reduced only by increasing the no. of basis functions. Error (b) can be reduced by altering the k.cntdot.p implementation so as to bend upwards the second lowest bulk band, and to couple the conduction band into the s-like dot valence state. Our direct diagonalization approach provides an accurate and practical replacement to the std. model in that it is rather general, and can be performed simply on a std. workstation.

IT 1306-24-7, Cadmium selenide (CdSe), properties
(applicability of k.cntdot.p envelope-function method to
electronic structure of **quantum** dots)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 65-3 (General Physical Chemistry)

Section cross-reference(s): 76

ST envelope function electronic structure **quantum** dot

IT Band structure

Brillouin zone

Electronic state

Electronic structure

Excited electronic state

Matrix elements (**quantum** mechanics)

Pseudopotential

Quantum dot devices

Schrodinger equation

Wave function

(applicability of k.cntdot.p envelope-function method to
electronic structure of **quantum** dots)

IT 1306-24-7, Cadmium selenide (CdSe), properties 22398-80-7,

Indium phosphide (InP), properties

(applicability of k.cntdot.p envelope-function method to
electronic structure of **quantum** dots)

L56 ANSWER 17 OF 34 HCA COPYRIGHT 2003 ACS

128:232382 The formation of ultrafine particles of metal sulfide by the
electrostatic spray pyrolysis method. Okuyama, Kikuo; Lenggoro, I.

Wuled; Tagami, Norikazu; Tamaki, Shinkichi; Tohge, Noboru
(Department of Chemical Engineering, Hiroshima University,
Higashi-Hiroshima, 739, Japan). Kona, 15, 227-234 (English) 1997.
CODEN: KONAE7. ISSN: 0288-4534. Publisher: Hosokawa Powder
Technology Foundation.

AB In the prepn. of fine particles of metal sulfide, e.g., zinc sulfide and cadmium sulfide, using the spray pyrolysis method, the electrostatic spray method was applied to **atomize** the starting solns. The optimum operation conditions where the droplets could be generated from a Taylor cone were examd. exptl. It was shown that the use of the electrostatic spray pyrolysis method is available for prepn. of several dozens **nanometer-size fine particles**, in comparison with a typical ultrasonic spray pyrolysis method that produced particles having several hundreds **nanometer size**.

IT 1306-23-6, Cadmium sulfide, processes 1314-98-3,
Zinc sulfide, processes
(formation of ultrafine particles of metal sulfide by
electrostatic spray pyrolysis method)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

CC 49-5 (Industrial Inorganic Chemicals)

IT 1306-23-6, Cadmium sulfide, processes 1314-98-3,
Zinc sulfide, processes
(formation of ultrafine particles of metal sulfide by
electrostatic spray pyrolysis method)

L56 ANSWER 18 OF 34 HCA COPYRIGHT 2003 ACS

128:224219 A nano-fabrication technology based on cluster chemistry.

Applications for single-electron electronics. Sato, Toshihiko
(Cent. Res. Lab., Hitachi, Ltd., Kokubunji, 185-0014, Japan).

Nippon Butsuri Gakkaishi, 53(3), 165-169 (Japanese) 1998. CODEN:
NBGS AW. ISSN: 0029-0181. Publisher: Physical Society of Japan.

AB A review on with 12 refs. The single-electron element electronics used clusters. If a size of metal or **semiconductor** has the order of from several to several tens nm, the idea of the single-electron element is real sized. For this, chem. synthesis of such cluster is expected. U. Kreibitz et. al. made composite films of the Schmid cluster (Au₅₅-, Cl-, P-, and (C₆H₅)₃-, diam. .apprx.1.4 nm) by the impregnation of polystyrene matrix. Comparing with a composite film of Au colloidal particles (diam. .apprx.20 nm) with polystyrene matrix impregnated, it was ascertained that the

Schmid cluster showed a larger decrease of elec. cond. at low temp. with a large Coulomb blockade effect. C. Schonenberger et al. showed the Coulomb charging effect by STM of Pd colloidal particles, where they used a substrate, a barrier, Pd colloid, a gap as a barrier, and STM probe as a double tunneled junction. E. S. Soldatov et al. used Carboran (1,7-(CH₃)₂-1,2-C₂B₁₀H₉Tl(OCOCF₃)₂) cluster mols. as islands, which were dipped into stearic acid LB film. The STM probe tip, the cluster mols. in the LB film, a graphite substrate, a layer of alumina insulator, and a gate electrode made a system for the single electron element path. In this case the coulomb staircase was obsd. at room temp. In these expts. the islands are covered with adsorbed org. mol. layers, which shows that the covered layers work as electron tunneling barrier and the barrier should be high (.apprx.100 kT = 3 eV) and evenly thin enough (.apprx.2 nm at .apprx.1 V bias elec. voltage and .apprx.1 nA tunneling current). M. Korgi et al. made a junction constructed with STM with Pt tip, Au cluster, a barrier, and Au(111) thin film substrate, and, as the barrier a,a'-xylyldithio SAM (self-assembling monolayer) film was used. The thickness of the SAM film was 0.83 nm. The Au clusters were made by rapid cooling of aerosol of adiabatically expanded Au vapor and have cryst. surface, mainly of [111]. The obsd. I-V characteristics agreed with the simulation curve and the tunned resistance value of a,a'-xylyldithiol SAM film was obtained. D. L. Klein et al. made a gap of 5 nm in the plane-wiring pattern of Au on the SiO₂ substrate and, in the small gap, Au colloid particles of 5 nm diam. were fixed with 1,6-hexanedithiol. In the I-V curve of this system, the Coulomb staircase was obsd. Controlling the covering of the Au particles, one dimensional or 2 dimensional structure of Au particles were automatically obtained. A transistor (single electron transistor) made with 3 Au-fine-particles was prepd. and its I-V curve was obsd. at 4.2 K. As the island, Au, Pd, or Pt colloid, or CdS or CdSe can be used. The semiconductor fine particles make the quantum dots. As the barrier layer, instead of -SH of 1,6-hexanedithiol, -NH₂, -NC etc. can be used. Silane coupler, too, can be used. For the elec. contact to the fine particle, a nanometer scale Pt-tweezers with 4 nm gap was prepd. by A. Bezryadin et al. These tweezers made possible a self-limiting process. By the cluster-chem., the way to make the nanometer scale single electron elements is beginning.

IT 1306-23-6, Cadmium sulfide (CdS), properties
 1306-24-7, Cadmium selenide, properties
 (conductive island; a nano-fabrication technol. based on cluster chem. Applications for single-electron electronics)

RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 76-0 (Electric Phenomena)

IT **Quantum** dot devices

(nano-fabrication technol. based on cluster chem. and applications for single-electron electronics)

IT 1306-23-6, Cadmium sulfide (CdS), properties

1306-24-7, Cadmium selenide, properties

(conductive island; a nano-fabrication technol. based on cluster chem. Applications for single-electron electronics)

L56 ANSWER 19 OF 34 HCA COPYRIGHT 2003 ACS

128:29112 Cadmium selenide **quantum** dot doping of organic-inorganic hybrid materials derived by sol-gel processing. Ou, Duan Li; Seddon, Angela B. (Centre Glass Research, Department Engineering Materials, University Sheffield, Sheffield, S1 3JD, UK). Proceedings of SPIE-The International Society for Optical Engineering, 3136(Sol-Gel Optics IV), 348-357 (English) 1997.. CODEN: PSISDG. ISSN: 0277-786X. Publisher: SPIE-The International Society for Optical Engineering.

AB **Nano-sized**, Ph-capped CdSe **quantum**

dots were isolated, after prepn. inside reversed micelles present in AOT/H₂O/heptane, and then successfully redispersed in the amino-silicate ceramer (i.e. organically modified silicate) derived from 3-aminopropyl-(trimethoxy)silane. Doped ceramers were formed into films of a few .mu.m thickness or small bulk samples. The ceramers were structurally characterized by means of absorption spectroscopy in the visible and near-IR ranges, and by ²⁹Si solid state NMR spectroscopy. The siloxane matrix of the amino-silicate ceramer was found to be 84% condensed and polymeric water mols. are H bonded into the matrix, presumably at silanol and amine sites. CdSe dots of apparently good monodispersity and radius 1.5 to 2.4 nm (going from yellow to red in visual appearance) were redispersed in the amino-silicate ceramer. Attempts to prep. larger dots resulted in **flocculation** of the CdSe. The max. loading of CdSe dots in the amino-silicate matrix was measured to be 2.05 wt.% CdSe_{0.72}, where the d. of the amino-silicate host was around 0.5 to 0.7 of the d. of a typical, melt-derived silicate glass.

IT 1306-24-7, Cadmium selenide, uses

(cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 76-3 (Electric Phenomena)

Section cross-reference(s): 57, 75

- ST cadmium selenide **quantum** dot doping ceramer; sol gel processing ceramer doping
- IT Ceramers
 Quantum dot devices
 Sol-gel processing
 (cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)
- IT IR spectroscopy
 (near-IR, structural characterization of ceramer by; cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)
- IT Absorption spectroscopy
 NMR spectroscopy
 (structural characterization of ceramer by; cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)
- IT 1306-24-7, Cadmium selenide, uses
 (cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)
- IT 13822-56-5, 3-Aminopropyltrimethoxysilane
 (ceramers derived from; cadmium selenide **quantum** dot doping of org.-inorg. hybrid materials derived by sol-gel processing)

L56 ANSWER 20 OF 34 HCA COPYRIGHT 2003 ACS

- 127:127102 **Ultrasound**-induced formation and dissolution of colloidal CdS. Sostaric, Joe Z.; Caruso-Hobson, Rachel A.; Mulvaney, Paul; Grieser, Franz (Advanced Mineral Products Research Center, School of Chemistry, University of Melbourne, Parkville, 3052, Australia). Journal of the Chemical Society, Faraday Transactions, 93(9), 1791-1795 (English) 1997. CODEN: JCFTEV. ISSN: 0956-5000. Publisher: Royal Society of Chemistry.
- AB The sonochem. formation of Q-state CdS colloids and the dissoln. of larger colloidal CdS particles are described. In systems contg. mercaptopropionic acid, the action of **ultrasound** produces H₂S and in the presence of Cd²⁺(aq) ions, colloidal CdS is formed. The mechanism for the prodn. of H₂S appears to be predominantly H-atom attack on the thiol group of the mercaptan, although there is evidence that the local heating from **ultrasound** also contributes to H₂S formation. The colloid particles produced by the **ultrasound** process clearly show **quantum** size effects and are estd. to be less than 3 nm in diam. The dissoln. of colloidal CdS at pH 10.5 appears to be due to the reaction of H₂O₂ and O₂⁻ with the colloids. It has been found that the reaction can be inhibited by the addn. of Na₂S to the colloidal soln. Results also show that the reactions involved in the presence of Na₂S are complex and that sulfur oxyanions most likely partake in the overall scheme once they are formed.
- IT 1306-23-6P, Cadmium sulfide, properties
 (**ultrasound**-induced prodn. of **nanometer-sized** semiconducting colloidal CdS particles)
- RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 76, 78

ST colloidal cadmium sulfide **ultrasound** induced dissoln;
coagulation cadmium sulfide colloid dissoln **ultrasound**;
inhibition dissoln colloid sodium sulfide

IT Polyphosphoric acids
(sodium salts; **ultrasound**-induced prodn. of
nanometer-sized semiconducting colloidal CdS
particles)

IT Colloids
Dissolution
Sound and **Ultrasound**
(**ultrasound**-induced prodn. of **nanometer-**
sized semiconducting colloidal CdS particles)

IT 7783-06-4, Hydrogen sulfide, properties 22537-48-0, Cadmium 2+,
properties

(**ultrasound**-induced prodn. of **nanometer-**
sized semiconducting colloidal CdS particles)

IT 52-66-4 79-42-5, 2-Mercaptopropionic acid 107-96-0,
3-Mercaptopropionic acid 1313-82-2, Sodium sulfide, properties
10108-64-2, Cadmium chloride 10124-36-4, Cadmium sulfate

(**ultrasound**-induced prodn. of **nanometer-**
sized semiconducting colloidal CdS particles)

IT 1306-23-6P, Cadmium sulfide, properties
(**ultrasound**-induced prodn. of **nanometer-**
sized semiconducting colloidal CdS particles)

IT 7722-84-1, Hydrogen peroxide, properties 11062-77-4, Superoxide
(**ultrasound**-induced prodn. of **nanometer-**
sized semiconducting colloidal CdS particles)

L56 ANSWER 21 OF 34 HCA COPYRIGHT 2003 ACS

126:306975 Manufacture of nanocrystalline materials, and the
nanocrystalline materials obtained and devices containing the
nanocrystalline materials. O'Brien, Paul; Trindade, Tito (Imperial
College of Science Technology and Medicine, UK; O'Brien, Paul;
Trindade, Tito). PCT Int. Appl. WO 9710175 A1 19970320, 28 pp.
DESIGNATED STATES: W: JP, US; RW: AT, BE, CH, DE, DK, ES, FI, FR,
GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN: PIXXD2.
APPLICATION: WO 1996-GB1942 19960809. PRIORITY: GB 1995-18910
19950915.

AB A process comprises .gtoreq.1 1st ions and .gtoreq.1 2nd ions
different from the 1st ions (at least the 1st ion is a metal ion),
and comprises contacting a metal complex comprising the 1st ion and
the 2nd ion with a dispersing medium suitable to form the nanocryst.
material, wherein the dispersing medium is at a temp. allowing
formation by pyrolysis of the nanocryst. material when contacted
with the metal complex. The nanocryst. material is used in

nonlinear optical devices, solar cells, and LED's. $\text{Cd}(\text{Me})_2$ was reacted with bisdiethyldiselenocarbamate $\text{Cd}(\text{II})$ in dry PhMe under N at room temp. to give Me diethyldiselenocarbamate $\text{Cd}(\text{II})$ (I). Then, 0.5 mmol I was placed in 10 mL tri-n-octylphosphine, and the mixt. was filtered, after which 30 g tri-n-octylphosphine oxide was injected, and the mixt. heated at 250.degree. for 0.5 h to give a red soln. that was dild. with a large amt. of MeOH.

Flocculated material was removed by filtration, and the PhMe removed in vacuum to give deep red CdSe.

IT 1306-23-6P, Cadmium sulfide, preparation 1306-24-7P
, Cadmium selenide, preparation 1314-98-3P, Zinc sulfide,
preparation 1315-09-9P, Zinc selenide.

(process for nanocryst. material manuf. for LED's, nonlinear optical devices, and solar cells)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

$\text{Cd}=\text{S}$

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

$\text{Cd}=\text{Se}$

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

$\text{S}=\text{Zn}$

RN 1315-09-9 HCA

CN Zinc selenide (ZnSe) (9CI) (CA INDEX NAME)

$\text{Se}=\text{Zn}$

IC ICM C01B019-04

CC 49-5 (Industrial Inorganic Chemicals)

Section cross-reference(s): 52, 73, 76

IT 593-79-3P, Methyl selenium 1303-00-0P; Gallium arsenide,
preparation 1306-23-6P, Cadmium sulfide, preparation
1306-24-7P, Cadmium selenide, preparation 1314-98-3P
, Zinc sulfide, preparation 1315-09-9P, Zinc selenide
22398-80-7P, Indium phosphide, preparation

(process for nanocryst. material manuf. for LED's, nonlinear optical devices, and solar cells)

L56 ANSWER 22 OF 34 HCA COPYRIGHT 2003 ACS

126:177296 Characterization of Covalently Immobilized Q-CdS Particles on
Au(111) by Scanning Tunneling Microscopy and Tunneling Spectroscopy

with High Reproducibility. Miyake, Masahide; Matsumoto, Hajime; Nishizawa, Matsuhiko; Sakata, Takao; Mori, Hirotaro; Kuwabata, Susumu; Yoneyama, Hiroshi (Department of Applied Chemistry Faculty of Engineering, Osaka University, Suita, 565, Japan). Langmuir, 13(4), 742-746 (English) 1997. CODEN: LANGD5. ISSN: 0743-7463. Publisher: American Chemical Society.

AB Size-quantized CdS particles (Q-CdS) capped with 2-aminoethanethiol and 2-mercaptoethanesulfonate were prepd. by the AOT/heptane inverse micelles method. The resulting CdS particles were covalently immobilized in a high dispersion on an Au (111) surface coated previously with a self-assembled monolayer of 3,3'-dithiobis(succinimidyl propionate). The immobilized Q-CdS particles were stable against tip scanning in STM. Tunneling spectroscopy of a single particle whose size was detd. from a STM image allowed detn. of the band-gap energy of the size-quantized particle, and the band-gap value obtained agreed with that predicted from the tight-binding approxn.

IT 1306-23-6P, Cadmium sulfide, properties
(size-quantized CdS particles capped with thiol compds. and immobilized covalently on Au (111) precoated by self-assembled monolayer studied by STM and STS)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 76, 78

ST tunneling spectroscopy size quantized cadmium sulfide; gold immobilized cadmium sulfide **nanoparticle** STM; thiol capped cadmium sulfide particle

IT Band gap

Nanoparticles

Quantum size effect

(size-quantized CdS particles capped with thiol compds. and immobilized covalently on Au (111) precoated by self-assembled monolayer studied by STM and STS)

IT 142-82-5, Heptane, uses 577-11-7, **Aerosol OT**
(reverse micelles; size-quantized CdS particles capped with thiol compds. and immobilized covalently on Au (111) precoated by self-assembled monolayer studied by STM and STS)

IT 1306-23-6P, Cadmium sulfide, properties
(size-quantized CdS particles capped with thiol compds. and immobilized covalently on Au (111) precoated by self-assembled monolayer studied by STM and STS)

L56 ANSWER 23 OF 34 HCA COPYRIGHT 2003 ACS

126:149063 Self-organization of size-selected **nanoparticles** into three-dimensional superlattices. Motte, Laurence; Billoudet, Francoise; Lacaze, Emanuelle; Pileni, Marie Paule (Laboratoire S.R.S.I., Universite P. et M. Curie, Paris, F-75231, Fr.). Advanced

Materials (Weinheim, Germany), 8(12), 1018-1020 (English) 1996.
CODEN: ADVMEW. ISSN: 0935-9648. Publisher: VCH.

AB The formation, using reverse micelles, and self-organization of Ag₂S nanocrystallites differing in their size (3, 4, 6 nm) is reported. Examn. of the crystallites by TEM and AFM in tapping mode revealed 3-dimensional **quantum** dot superlattices with a face-centered cubic structure. The superlattice was still present after several months. The size distribution could be narrowed by chem. treatment and particle extn. from the micelles.

IT 21548-73-2, Silver sulfide (Ag₂S)
(self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

RN 21548-73-2 HCA

CN Silver sulfide (Ag₂S) (8CI, 9CI) (CA INDEX NAME)

Ag-S-Ag

CC 66-5 (Surface Chemistry and Colloids)
Section cross-reference(s): 75, 76

ST silver sulfide nanocrystallite 3 dimensional superlattice; self assembly size selection **nanoparticle**; reverse micelle AOT silver sulfide **nanoparticle**; **quantum** dot superlattice silver sulfide **nanoparticle**

IT Superlattices
(**quantum** dot; self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

IT Micelles
(reverse; self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

IT Nanocrystals
Nanoparticles
Quantum dot devices
Surface structure

(self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

IT 21548-73-2, Silver sulfide (Ag₂S)
(self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

IT 150937-76-1, Butanedioic acid, sulfo-, 1,4-bis(2-ethylhexyl) ester, silver(1+) salt
(self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

IT 112-55-0, 1-Dodecanethiol 577-11-7, **Aerosol** OT
(self-organization of size-selected silver sulfide **nanoparticles** into three-dimensional superlattices)

L56 ANSWER 24 OF 34 HCA COPYRIGHT 2003 ACS

126:24841 Electrophotographic liquid developer having colorant comprising stable dispersion of magnetic particles in aqueous medium. Ziolo, Ronald F. (Xerox Corp., USA). U.S. US 5567564 A

19961022, 22 pp., Cont.-in-part of U.S. 5,322,756. (English).
CODEN: USXXAM. APPLICATION: US 1994-178540 19940107. PRIORITY: US
1992-910808 19920709; US 1992-910805 19920709; US 1992-910803
19920709.

AB The title developer comprises a low-optical-d. magnetic fluid which is a stable dispersion of fine magnetic particles. A method of forming the stable dispersion comprises providing an ion exchange resin, loading the ion exchange resin with an ion capable of forming a magnetic phase, treating the loaded resin to form magnetic particles, and **micronizing** the resin and magnetic particles in a fluid to form an aq. stable colloid. The invention provides submicron particles and submicron particles which are dispersed in an aq. colloid. A method of forming the stable dispersion comprises providing an ion exchange resin, loading the ion exchange resin with an ion, treating the loaded resin to form **nanoscale** particles, and fluidizing the resin and particles to form an aq. stable colloid. A method of forming magnetic materials having tunable magnetic properties and the magnetic materials formed thereby are disclosed. The magnetic materials contain both single-domain and multidomain particles and have high initial permeability while maintaining coercivity and remanence in the material.

IT 1306-23-6, Cadmium sulfide, uses 1317-40-4, Copper sulfide (CuS)

(electrophotog. liq. developers having colorants comprising stable dispersions of magnetic particles in aq. media contg.)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1317-40-4 HCA

CN Copper sulfide (CuS) (8CI, .9CI) (CA INDEX NAME)

Cu=S

IC ICM G03G009-00

NCL 430115000

CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)

IT 136-53-8, Zinc 2-ethylhexanoate 557-05-1, Zinc stearate 637-12-7, Aluminum stearate 1306-23-6, Cadmium sulfide, uses 1309-37-1, Ferric oxide, uses 1313-13-9, Manganese dioxide, uses 1317-40-4, Copper sulfide (CuS) 2457-01-4, Barium 2-ethylhexanoate 3002-63-9, Aluminum 2-ethylhexanoate 3006-15-3, Sodium dihexylsulfosuccinate 4980-46-5, Magnesium heptanoate 5136-76-5, Iron stearate 5261-20-1, Zinc heptanoate 6837-24-7, N-Cyclohexylpyrrolidone 6865-35-6, Barium stearate 7428-48-0, Lead stearate 7617-31-4, Copper stearate 7758-98-7, Copper sulfate, uses 7778-18-9, Calcium sulfate 7785-87-7, Manganese

sulfate 7786-81-4, Nickel sulfate 13586-82-8, Cobalt
 2-ethylhexanoate 15956-58-8, Manganese 2-ethylhexanoate
 16761-13-0, Lithium heptanoate 21150-88-9, Cadmium heptanoate
 22421-71-2, Calcium heptanoate 22464-99-9, Zirconium
 2-ethylhexanoate 24593-34-8, Cerium 2-ethylhexanoate 25322-68-3
 55464-99-8, Amberlite IRP-69 57029-31-9, Aluminum
 3,5-di-tert-butyl-.gamma.-resorcylate 91104-87-9, CGC 241
 101505-91-3, Dowex 50X8-400 112180-93-5
 (electrophotog. liq. developers having colorants comprising
 stable dispersions of magnetic particles in aq. media contg.)

L56 ANSWER 25 OF 34 HCA COPYRIGHT 2003 ACS

125:342034 Linear and nonlinear optical properties of CdS and CdSe
nanoparticles stabilized with poly(N-vinyl-2-pyrrolidone).
 Yao, Hiroshi; Takahara, Shigeru; Mizuma, Hirokazu; Kozeki, Takashi;
 Hayashi, Toyoharu (Central Res. Inst., Mitsui Toatsu Chemicals,
 Inc., Yokohama, 247, Japan). Japanese Journal of Applied Physics,
 Part 1: Regular Papers, Short Notes & Review Papers, 35(9A),
 4633-4638 (English) 1996. CODEN: JAPNDE. ISSN: 0021-4922.
 Publisher: Japanese Journal of Applied Physics.

AB CdS and CdSe **nanoparticles** were prep'd. in org. solvents in
 the presence of poly(N-vinyl-2-pyrrolidone) (PVP). PVP plays an
 essential role in preventing the **flocculation** of concd.
nanoparticles (stabilizing effect), and in controlling the
 particle size under the influence of the solvent used. FTIR
 measurements were performed to study the effect of the functional
 groups of PVP on particle size control at mol. levels. The
 PVP-coated CdS and CdSe **nanoparticles** obtained were
 dispersed in acrylonitrile-styrene (AS) copolymer or
 poly(2-hydroxyethyl methacrylate) (PHEMA) org. films, and 3rd-order
 nonlinear optical susceptibilities $|\chi^{(3)}|$ of these films were
 measured using a degenerate 4-wave mixing (DFWM) technique. The
 largest $|\chi^{(3)}|$ value of 1.1×10^{-7} esu was obtained by
 excitonic resonant excitation for approx. 4.0 vol.% CdS-doped PHEMA
 film.

IT 1306-23-6, Cadmium sulfide (CdS), properties
 1306-24-7, Cadmium selenide (CdSe), properties
 (linear and nonlinear optical properties of cadmium sulfide and
 Cd selenium **nanoparticles** stabilized with
 poly(N-vinylpyrrolidone) and within polymers)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

- CC 73-10 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- ST nonlinear optical cadmium sulfide selenide **nanoparticle**; sulfide cadmium **nanoparticle** polyvinylpyrrolidone nonlinear optical; selenide cadmium **nanoparticle** polyvinylpyrrolidone nonlinear optical; pyrrolidone vinyl polymer **semiconductor nanoparticle** optical; particle size **semiconductor** polymer nonlinear optical; UV visible cadmium selenide sulfide **nanoparticle**; IR cadmium selenide sulfide **nanoparticle** polymer
- IT Exciton
Flocculation
 Infrared spectra
 Particle size
 Ultraviolet and visible spectra
 (linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- IT Optical nonlinear property
 (four-wave mixing, linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- IT Optical nonlinear property
 (susceptibility, third-order, linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- IT 1306-23-6, Cadmium sulfide (CdS), properties
 1306-24-7, Cadmium selenide (CdSe), properties 9003-39-8,
 Poly(N-vinyl-2-pyrrolidone)
 (linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- IT 9003-54-7, Acrylonitrile-styrene copolymer 25249-16-5,
 Poly(2-hydroxyethyl methacrylate)
 (linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- IT 10022-68-1, Cadmium nitrate tetrahydrate 10326-28-0, Cadmium
 diperchlorate hexahydrate 12195-50-5, Sodium hydrogen selenide
 (linear and nonlinear optical properties of cadmium sulfide and Cd selenium **nanoparticles** stabilized with poly(N-vinylpyrrolidone) and within polymers)
- L56 ANSWER 26 OF 34 HCA COPYRIGHT 2003 ACS
 124:293479 The formation of ultrafine particles of metal sulfide by the electrostatic spray pyrolysis method. Okuyama, Kikuo; Lenggoro, I. Wuled; Tagami, Norikazu; Tamaki, Shinkichi; Tohge, Noboru (Dep. Chem. Eng., Hiroshima Univ., Higashihiroshima, 739, Japan). Funtai Kogaku Kaishi, 33(3), 192-8 (Japanese) 1996. CODEN: FKKADA. ISSN: 0386-6157. Publisher: Funtai Kogakkai.
- AB In the prepn. of fine particles of metal sulfide, such as zinc

sulfide and cadmium sulfide using the spray pyrolysis method, the electrostatic spray method was applied to **atomize** the starting solns. The optimum operation conditions where the droplets can be generated from a Taylor cone were examd. exptl. It is shown that the use of the electrostatic spray pyrolysis method is available for prepg. several dozen **nanometer size** fine **particles**, in comparison with a typical ultrasonic spray pyrolysis method that produces fine particles of several hundred **nanometer size**.

IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
, Zinc sulfide, preparation
(the formation of ultrafine particles of metal sulfide by the electrostatic spray pyrolysis method)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

CC 49-5 (Industrial Inorganic Chemicals)
IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
, Zinc sulfide, preparation
(the formation of ultrafine particles of metal sulfide by the electrostatic spray pyrolysis method)

L56. ANSWER 27 OF 34 HCA COPYRIGHT 2003 ACS

124:101574 Studies on absorption spectra of mixed zinc-cadmium sulfide **microparticles** stabilized in AOT-heptane-water and CTAB-chloroform-water inverse micellar systems. De, G. C.; Roy, A. M.; Saha, S. (Department of Chemical Technology, University of Calcutta, 92 Acharya Prafulla Chandra Road, Calcutta, 700 009, India). Journal of Photochemistry and Photobiology, A: Chemistry, 92(3), 189-92 (English) 1995. CODEN: JPPCEJ. ISSN: 1010-6030. Publisher: Elsevier.

AB Ultrafine particles composed of mixed crystals of $\text{ZnxCd}_{1-x}\text{S}$ can be generated in situ in AOT-heptane-water and CTAB-chloroform-water microemulsions using an **ultrasonic** processor. The microcrystallites exhibit the "**quantum** size effect". The compn. of mixed sulfides and the water content (pool size) of inverted micelles can be varied systematically and the band gap energies of the semiconductor particles can be detd. from the photoabsorption thresholds (edges). The exptl. results reveal that a homogeneous solid soln. of two sulfides is formed in CTAB-chloroform-water system. A method is proposed for detg. the bulk optical dielec. consts. of solid solns. of two semiconductors employing the Brus equation.

IT 12442-27-2, Cadmium zinc sulfide
(absorption spectra of mixed zinc-cadmium sulfide
microparticles stabilized in inverse micellar systems)

RN 12442-27-2 HCA

CN Cadmium zinc sulfide ((Cd,Zn)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
S	1	7704-34-9
Zn	0 - 1	7440-66-6
Cd	0 - 1	7440-43-9

CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)
Section cross-reference(s): 73, 76

ST zinc cadmium sulfide **microparticle** stabilization micelle;
semiconductor **microparticle** stabilization inverse micelle
photocatalysis

IT Ultraviolet and visible spectra
(absorption spectra of mixed zinc-cadmium sulfide
microparticles stabilized in inverse micellar systems)

IT Photolysis catalysts
Semiconductor materials
(absorption spectra of mixed zinc-cadmium sulfide
microparticles stabilized in inverse micellar systems in
relation to)

IT Size effect
(of mixed zinc-cadmium sulfide **microparticles**
stabilized in inverse micellar systems)

IT Energy level, band structure
(gap, of mixed zinc-cadmium sulfide **microparticles**
stabilized in inverse micellar systems)

IT Micelles
(reverse, absorption spectra of mixed zinc-cadmium sulfide
microparticles stabilized in inverse micellar systems)

IT 12442-27-2, Cadmium zinc sulfide
(absorption spectra of mixed zinc-cadmium sulfide
microparticles stabilized in inverse micellar systems)

IT 57-09-0, CTAB 67-66-3, Chloroform, uses 142-82-5, Heptane, uses
577-11-7, AOT 7732-18-5, Water, uses
(reverse micelle system; absorption spectra of mixed zinc-cadmium
sulfide **microparticles** stabilized in inverse micellar
systems)

L56 ANSWER 28 OF 34 HCA COPYRIGHT 2003 ACS

123:267376 Scanning Tunneling Microscopy, Tunneling Spectroscopy, and
Photoelectrochemistry of a Film of Q-CdS Particles Incorporated in a
Self-Assembled Monolayer on a Gold Surface. Ogawa, Shuichiro; Fan,
Fu-Ren F.; Bard, Allen J. (Department of Chemistry and Biochemistry,
University of Texas at Austin, Austin, TX, 78712, USA). Journal of
Physical Chemistry, 99(28), 11182-9 (English) 1995. CODEN: JPCHAX.

- ISSN: 0022-3654. Publisher: American Chemical Society.
- AB Films of AOT-capped (AOT = dioctyl sulfosuccinate) CdS **nanoparticles** (Q-CdS) prepd. by incorporation into a self-assembled monolayer (SAM) of hexanethiol on Au were prepd. These were imaged at neg. substrate bias in air by STM, and Q-CdS particles were shown to cover most of the area on the SAM. Continuous scanning of the tip over the substrate removed Q-CdS particles to the outside of the scanning area because of tip-substrate interactions. Scanning tunneling spectroscopy was carried out in air with the tip held over the thin CdS film (100 nm) and over individual Q-CdS particles in the layer. The i vs V and di/dV vs V curves indicated that the energy band gap of the Q-CdS particles is wider than that of the thin CdS films. The photoelectrochem. results also indicate that the onset photopotential is more neg. for smaller Q-CdS particles and is related to the level of conduction band.
- IT 1306-23-6, Cadmium sulfide, properties
(photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 72, 73, 76
- ST **quantum** particle cadmium sulfide monolayer gold; tunneling spectroscopy cadmium sulfide **quantum** particle; photoelectrochem STM cadmium sulfide **quantum** particle; alkanethiol self assembled monolayer **quantum** particle; photocurrent onset potential monolayer **quantum** particle
- IT Energy level, band structure
(gap in; photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- IT **Semiconductor** materials
(**nanoparticles**; photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- IT Electric potential
Photoconductivity and Photoconduction
Size effect
(photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- IT 111-31-9, 1-Hexanethiol 1306-23-6; Cadmium sulfide, properties
(photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in

- self-assembled hexanethiol monolayer on gold)
- IT 577-11-7, **Aerosol** OT
(photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- IT 7440-57-5, Gold, properties
(substrate; photoelectrochem., STM, and tunneling spectroscopy study of CdS **nanoparticles** (**quantum** or Q-CdS) in self-assembled hexanethiol monolayer on gold)
- L56 ANSWER 29 OF 34 HCA COPYRIGHT 2003 ACS
116:68154 Nucleotides as structural templates for the self-assembly of **quantum**-confined cadmium sulfide crystallites. Coffey, Jeffery L.; Chandler, Robin R. (Dep. Chem., Texas Christ. Univ., Fort Worth, TX, 76129, USA). Materials Research Society Symposium Proceedings, 206(Clusters Cluster-Assem. Mater.), 527-31 (English) 1991. CODEN: MRSPDH. ISSN: 0272-9172.
- AB The use of nucleotides as stabilizers in the formation of **quantum**-confined CdS is reported, with the size and compn. of the nucleotide exerting a significant effect on the resultant CdS structure. CdS formed from equimolar Cd²⁺ and S²⁻ (6 .times. 10⁻⁴ M) in the presence of a no. of nucleotides yields clusters with similar absorption spectra but which differ significantly with respect to emissive behavior and overall phys. stability. CdS/polynucleotide colloids (DNA, poly[A], poly[C] exhibit strong trap luminescence and are stable on a timescale of months, but analogous CdS prepd. from the mononucleotides ATP and AMP are virtually nonemissive and **flocculate** within hours, even upon stabilization at lower temps. (5 to -60.degree.). In addn. to their prepn. and spectroscopic properties, the results of TEM, at. force microscopy, and computer modeling studies on these CdS/nucleotide colloids are discussed.
- IT 1306-23-6, Cadmium sulfide, miscellaneous
(**quantum**-size particle stabilization of, with nucleotide as structural templates)
- RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 76
- ST cadmium sulfide **quantum** particle nucleotide stabilization
- IT Deoxyribonucleic acids
Nucleotides, uses
(as structural template for stabilization of **quantum** size cadmium sulfite crystallites)
- IT Luminescence
Optical absorption
(of cadmium sulfide **quantum** scale particles)
- IT Particle size

- (stabilization of **quantum**, for cadmium sulfide, nucleotides as structural templates for)
- IT 24937-83-5, Polyadenylic acid 30811-80-4, Polycytidylic acid (as structural template for stabilization of **quantum** size cadmium sulfite crystallites)
- IT 1306-23-6, Cadmium sulfide, miscellaneous (**quantum**-size particle stabilization of, with nucleotide as structural templates)
- L56 ANSWER 30 OF 34 HCA COPYRIGHT 2003 ACS
- 114:50197 Kinetics and mechanism of formation of **quantum**-sized cadmium sulfide particles in water-**Aerosol** OT-oil microemulsions. Towey, Thomas F.; Khan-Lodhi, Abid; Robinson, Brian H. (Sch. Chem. Sci., Univ. East Anglia, Norwich/Norfolk, NR4 7TJ, UK): Journal of the Chemical Society, Faraday Transactions, 86(22), 3757-62 (English) 1990. CODEN: JCFTEV. ISSN: 0956-5000.
- AB **Quantum**-sized cadmium sulfide particles were prep'd. in water-in-oil microemulsions stabilized by **Aerosol** OT. The equil. particle size was varied by changing the droplet size of the parent microemulsion in which the particles are prep'd. The UV-visible spectrum of such particles is sensitive to particle size and hence the kinetics of particle growth can be readily followed using UV-visible spectrophotometric detection. By using the stopped-flow method, particle growth was monitored at 280 nm as a function of droplet size, temp. and the nature of the oil phase. The rates are consistent with inter-droplet exchange of solubilizates being the rate-detg. step. The apparent activation enthalpies calcd. for the growth process agree well with those previously found for the exchange of small ions between microemulsion droplets. To interpret the kinetics, a relatively simple model is proposed based on the rapid coagulation mechanism first proposed by Smoluchowski. In the treatment, the usual diffusion-controlled rate const. is replaced with the rate const. for inter-droplet communication.
- IT 1306-23-6, Cadmium sulfide, properties (particles of, formed in **Aerosol** OT-oil-water microemulsions)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)
- Cd=S
- CC 66-4 (Surface Chemistry and Colloids).
Section cross-reference(s): 76, 78
- ST cadmium sulfide particle AOT oil microemulsion; water oil microemulsion cadmium sulfide particle; kinetics coagulation cadmium sulfide particle microemulsion; **quantum** particle prepn cadmium sulfide
- IT Particles
(**nanosize**, formation of, in water-in-oil microemeulsions)

- IT **Semiconductor** materials
(colloidal, formation of, in water-in-oil microemulsion)
- IT Emulsions
(micro-, water-in-oil, **nanoparticle** formation in)
- IT 7732-18-5
(emulsions, micro-, water-in-oil, **nanoparticle** formation in)
- IT **1306-23-6**, Cadmium sulfide, properties
(particles of, formed in **Aerosol** OT-oil-water microemulsions)
- IT 577-11-7, **Aerosol**-OT
(**quantum** particles of cadmium sulfide formed in microemulsions contg.)

L56 ANSWER 31 OF 34 HCA COPYRIGHT 2003 ACS

112:128701 Synthesis of porous **quantum**-size cadmium sulfide membranes: photoluminescence phase shift and demodulation measurements. Spanhel, Lubomir; Anderson, Marc A. (Water Chem. Program, Univ. Wisconsin, Madison, WI, 53706, USA). Journal of the American Chemical Society, 112(6), 2278-84 (English) 1990. CODEN: JACSAT. ISSN: 0002-7863.

AB Optically transparent CdS membranes were synthesized. Colloidal Q-CdS particles (particle diam. $d_p < 40$.ANG.) carrying short phosphate chains and excess Cd^{2+} ions have been directly converted into a microporous membrane form. By controlling the ionic strength and particle concns., one can link self-organized fusion-free aggregates and avoid formation of powder-like **flocculation** products. The resultant unsupported membranes exhibit different mech. properties (e.g., rigidity, delayed elasticity, and soly.) in the presence of water depending upon the prepn. method. The membrane form of CdS has distinctively different photophys. properties than the precursor colloidal form. Conversion of weakly red luminescent colloids (broad band at 700 nm) into membranes activated an intense room temp. band edge luminescence (BEL) (narrow bands between 450 and 500 nm) attributed to the recombination of excitons and/or shallowly trapped electron/hole pairs. A specific solvent effect has been obsd. indicating the major role of water and the related acid-base chem. in producing radiationless recombination centers at the particle surface. In membrane/solvent expts., water was found to be a very efficient quencher of the emission while alcs. and acetonitrile did not induce any changes in luminescence properties. A novel Multi-Harmonic Fourier Transform (MHFT) technique was used to det. the av. lifetimes of the BEL decay process (.apprxeq.10 ns in the colloidal form and .apprxeq.70 ns in the corresponding membrane form). Simultaneously detected (multiple-frequency domain) phase/modulation data have been used to describe the complex BEL decay, and a three-exponential law best fits the data.

- IT **1306-23-6**, Cadmium sulfide, properties
(porous membranes from, prepn. and luminescence phase shift and demodulation measurements for)
- RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

IT Exciton
(luminescence of, in cadmium sulfide **quantum**-size porous membranes)

IT Membranes
(**quantum**-size cadmium sulfide, prepn. and luminescence of)

IT 1306-23-6, Cadmium sulfide, properties
(porous membranes from, prepn. and luminescence phase shift and demodulation measurements for)

L56 ANSWER 32 OF 34 HCA COPYRIGHT 2003 ACS

102:207005 Ultrafine particles in flotation. Warren, L. J. (Div. Miner. Chem., CSIRO, Bentley, 6102, Australia). Symposia Series - Australasian Institute of Mining and Metallurgy, 40(Princ. Min. Flotation), 185-213 (English) 1984. CODEN: SSAMDP. ISSN: 0314-6154.

AB A review with 132 refs. The flotation of powd. minerals such as quartz, SnO₂, TiO₂, Fe₂O₃, Fe₃O₄, Al₂O₃, BaSO₄, CaF₂, pyrite [1309-36-0], sphalerite [12169-28-7], galena [12179-39-4], chalcopryrite [1308-56-1], chalcocite [21112-20-9], and CaWO₄ (.ltoreq.10.mu. sizes) is considered. The slime coatings on particles, carrier flotation, froth stability, entrainment of ultrafine gangue, excess reagent consumption, slow rate of flotation, reactive surfaces, and selective **flocculation** are discussed.

IT 12169-28-7P 21112-20-9P
(flotation of, ultrafine particles in)

RN 12169-28-7 HCA

CN Sphalerite (ZnS) (9CI) (CA INDEX NAME)

S=Zn

RN 21112-20-9 HCA

CN Chalcocite (Cu₂S) (9CI) (CA INDEX NAME)

Cu-S-Cu

CC 54-0 (Extractive Metallurgy)

ST review ore powder coating flotation; **flocculation** cassiterite magnetite review; alumina ultrafine flotation review; barite ultrafine flotation review; fluorite ultrafine flotation review; pyrite ultrafine flotation review; sphalerite ultrafine flotation review; galena ultrafine flotation review; chalcopryrite

ultrafine flotation review; chalcocite ultrafine flotation review
 IT 1308-56-1P, preparation 1309-36-0P, preparation 1309-38-2P,
 preparation 1317-45-9P 1317-60-8P, preparation 1344-28-1P,
 preparation **12169-28-7P** 12179-39-4P 13462-86-7P
 13463-67-7P, preparation 14542-23-5P, preparation 14808-60-7P,
 preparation **21112-20-9P**
 (flotation of, ultrafine particles in)

L56 ANSWER 33 OF 34 HCA COPYRIGHT 2003 ACS

76:141978 Glowing bouncing putty. Dean, Hubert W.; Hovey, Almon G.
 (Peter Hodgson). U.S. US 3634280 19720111, 2 pp. (English).
 CODEN: USXXAM. APPLICATION: US 1968-788347 19681231.

AB Non-toxic, phosphorescent bouncing putty is prepd. from
 dimethylsiloxane contg. 3-15% **flocculent** silica
 [7631-86-9], 5-50% **microspheres** having refractive index
 similar to that of the siloxane, and 1-25% phosphor. A putty contg.
 siloxane 70, SiO₂ 5, polyethylene [9002-88-4] **microspheres**
 17.5, and activated zinc sulfide [1314-98-3] 7.5% gives a
 green light when exposed to a light source.

IT **1314-98-3**, uses and miscellaneous
 (phosphors, for glowing bouncing putty)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

IC C09K; A63B

NCL 252301300R

CC 37 (Plastics Fabrication and Uses)

IT Filling materials

(polyethylene **microspheres** and silica, for
 phosphorescent bouncing putty)

IT 9002-88-4

(**microspheres**, in phosphorescent bouncing putty)

IT **1314-98-3**, uses and miscellaneous

(phosphors, for glowing bouncing putty)

L56 ANSWER 34 OF 34 HCA COPYRIGHT 2003 ACS

51:85224 Original Reference No. 51:15353f-g The effect of electrolytes
 on the flotability of fine particles of zinc blonde. Mukai,
 Shigeru; Morikawa, Masakiyo (Kyoto Univ.). Nippon Kogyo Kaishi, 73,
 289-94 (Unavailable) 1957.

AB The effects of pH and electrolytes (NaCl, AgNO₃, CuSO₄, ZnSO₄, and
 Na alginate) on the flotability of -1 .mu. and 150-300 mesh
 particles were studied. The -1 .mu. **particles**
 have extremely low flotability at any pH value, whereas 150-300 mesh
 particles have nearly the max. flotability attainable. The former
 can be floated by **flocculation** through the addn. of the
 electrolytes (except Na alginate), the concn. of which can control
 the flotability from 0 to 100%. Na alginate counteracts this
 effect. The electrolytes have no large effect on the flotability of

larger particles. CuSO_4 is effective over a wide pH range; the flotability of $-1 \mu\text{m}$ particles at the CuSO_4 concn. 0.4 millimoles/l. was nearly 100% at pH 3.3 and about 97% at pH 9. ZnSO_4 was effective only in a narrow range of pH.

IT 12169-28-7, Sphalerite
(flotation of fine, electrolyte effect on)
RN 12169-28-7 HCA
CN Sphalerite (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 9 (Metallurgy and Metallography)
IT 12169-28-7, Sphalerite
(flotation of fine, electrolyte effect on)

=> d 157 1-25 cbib abs hitstr hitind

L57 ANSWER 1 OF 25 HCA COPYRIGHT 2003 ACS

137:224745 Supersonic nanocrystal deposition for nanostructured materials. Nichols, W. T.; O'Brien, D. T.; Malyavanatham, G.; Becker, M. F.; Keto, J. W. (Department of Physics, University of Texas at Austin, Austin, TX, 78712, USA). Materials Research Society Symposium Proceedings, 703 (Nanophase and Nanocomposite Materials IV), 209-214 (English) 2002. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB The authors exptl. demonstrate the large scale prodn. and controlled collection of metal and semiconductor nanocrystals by laser ablation of **microparticles** entrained at high d. in a flowing **aerosol**. For silver, the produced nanocrystals exhibit bimodal, log-normal size distributions. Mean particle sizes are controlled from 3 to 16 nm by varying the type and pressure of carrier gas as well as the laser fluence. For collection, a micronozzle orifice ($d = 200 \mu\text{m}$) accelerates the nanocrystals through a sonic jet into a vacuum chamber for deposition onto a room-temp. substrate. The authors describe two regimes of deposition that depend on the nanocrystal's energy per atom on impact. Soft landings ($E \text{ mchlt. } 1 \text{ eV/atom}$) preserve the individual particle properties such as size and shape. Low-energy impaction is demonstrated for CdSe in an argon carrier gas. The CdSe nanoclusters remain cryst. upon deposition and display visible photoluminescence. At higher particle impaction velocities ($E \text{ apprx. } 0.3 \text{ eV/atom}$), nanocrystals exhibit the onset of self-sintering upon impact. At high no. densities, adherent, conductive lines are formed from the deposited silver nanocrystals. Line widths of $33 \mu\text{m}$ FWHM are directly written onto substrates using a $200 \mu\text{m}$ diam. nozzle.

IT 1306-24-7, Cadmium selenide (CdSe), processes
(supersonic nanocrystal deposition for nanostructured metals and semiconductors)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 76-2 (Electric Phenomena)

IT **Aerosols**

Laser ablation

Microparticles

(prodn. of metal and semiconductor nanocrystals by laser ablation of **microparticles** entrained in flowing **aerosol**)

IT Nanocrystals

Sound and **Ultrasound**

(supersonic nanocrystal deposition for nanostructured materials)

IT **1306-24-7**, Cadmium selenide (CdSe), processes

(supersonic nanocrystal deposition for nanostructured metals and semiconductors)

L57 ANSWER 2 OF 25 HCA COPYRIGHT 2003 ACS

137:37885 Analytical energy gradient evaluation in relativistic and nonrelativistic density functional calculations. Wang, Fan; Li, Lemin (State Key Laboratory of Rare Earth Materials Chemistry and Applications, College of Chemistry and Molecular Engineering, Peking University, Beijing, 100871, Peop. Rep. China). Journal of Computational Chemistry, 23(9), 920-927 (English) 2002. CODEN: JCCHDD. ISSN: 0192-8651. Publisher: John Wiley & Sons, Inc..

AB The expressions of anal. energy gradients in d. functional theory and their implementation in programs are reported. The evaluation of anal. energy gradients can be carried out in the fully 4-component relativistic, approx. relativistic, and nonrelativistic d. functional calcns. under local d. approxn. or general gradient approxn. with or without frozen core approxn. using different basis sets in our programs. The translational invariance condition and the fact that the one-center terms do not contribute to the energy gradients are utilized to improve the calcn. accuracy and to reduce the computational effort. The calcd. results of energy gradients and optimized geometry as well as **atomization** energies of some mols. by the anal. gradient method are in very good agreement with results obtained by the numerical deriv. method.

IT **1303-60-2**, Gold sulfide (Au₂S)

(anal. energy gradient evaluation in relativistic and nonrelativistic d. functional calcns.)

RN 1303-60-2 HCA

CN Gold sulfide (Au₂S) (6CI, 8CI, 9CI) (CA INDEX NAME)

Au-S-Au

CC 65-3 (General Physical Chemistry)

IT **Atomization** enthalpy

Density functional theory

Local density approximation
Molecular structure
Relativistic **quantum** chemistry
Total energy

(anal. energy gradient evaluation in relativistic and nonrelativistic d. functional calcns.)

IT 1303-60-2, Gold sulfide (Au₂S) 1309-60-0, Lead oxide (PbO₂) 7705-07-9, Titanium chloride (TiCl₃), properties 12187-12-1, Bismuth mol. (Bi₂), properties
(anal. energy gradient evaluation in relativistic and nonrelativistic d. functional calcns.)

L57 ANSWER 3 OF 25 HCA COPYRIGHT 2003 ACS

135:264645 Method of forming thin film using **ultrasound atomization spraying** without using vacuum chamber.

Nishio, Takeshi; Shinmoto, Tetsuya; Higuchi, Hiroshi (Matsushita Battery Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001259494 A2 20010925, 10 pp. (Japanese). CODEN: JKXXAF.
APPLICATION: JP 2000-76930 20000317.

AB The invention relates to **ultrasound atomization** and **spraying** of a soln. contg. **microparticles** on a substrate to form a metal sulfide or a metal oxide film such as Sn oxide, Cd sulfide, Zn sulfide used for a photovoltaic device and display devices.

IT 1306-23-6, Cadmium sulfide, processes 1314-98-3, Zinc sulfide, processes
(formation of thin film using **ultrasound atomization spraying** without using vacuum chamber)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

IC ICM B05B017-06

ICS B01J019-00; B05D001-02; B05D003-02; H01L021-368

CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 42, 76

ST film formation **ultrasound atomization spraying**; display device film formation; photovoltaic device film formation

IT **Atomizing (spraying)**

(acoustic; formation of thin film using **ultrasound atomization spraying** without using vacuum

- chamber)
- IT Optical imaging devices
Photoelectric devices
(formation of thin film using **ultrasound atomization spraying** without using vacuum chamber)
- IT 1306-23-6, Cadmium sulfide, processes 1314-98-3,
Zinc sulfide, processes 1332-29-2, Tin oxide
(formation of thin film using **ultrasound atomization spraying** without using vacuum chamber)

L57 ANSWER 4 OF 25 HCA COPYRIGHT 2003 ACS

- 135:113708 Correlation versus mean-field contributions to excitons, multiexcitons, and charging energies in **semiconductor quantum** dots. Shumway, J.; Franceschetti, A.; Zunger, Alex (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Physical Review B: Condensed Matter and Materials Physics, 63(15), 155316/1-155316/13 (English) 2001. CODEN: PRBMDO. ISSN: 0163-1829. Publisher: American Physical Society.
- AB Single-dot spectroscopy is now able to resolve the energies of excitons, multiexcitons, and charging of **semiconductor quantum** dots with .ltorsim.1 meV resoln. The authors discuss the phys. content of these energies and show how they can be calcd. via **quantum** Monte Carlo (QMC) and CI methods. The spectroscopic energies have 3 pieces: (i) a perturbative part reflecting carrier-carrier direct and exchange Coulomb energies obtained from fixed single-particle orbitals, (ii) a self-consistency correction when the single particle orbitals are allowed to adjust to the presence of carrier-carrier interaction, and (iii) a correlation correction. The authors 1st apply the QMC and CI methods to a model single-particle Hamiltonian: a spherical dot with a finite barrier and single-band effective mass. This allows one to test the convergence of the CI and to establish the relative importance of the 3 terms (i)(iii) above. Next, the authors apply the CI method to a realistic single-particle Hamiltonian for a CdSe dot, including via a pseudopotential description the **atomistic** features, multiband coupling, spin-orbit effects, and surface passivation. The authors include all bound states (up to 40,000 Slater determinants) in the CI expansion. Study shows that (1) typical exciton transition energies, which are .apprx.1 eV, can be calcd. to better than 95% by perturbation theory, with only a .apprx. 2 meV correlation correction; (2) typical electron addn. energies are .apprx.40 meV, of which correlation contributes very little (.apprx.1 meV); (3) typical biexciton binding energies are pos. and .apprx.10 meV and almost entirely due to correlation energy, and exciton addn. energies are .apprx.30 meV with nearly all contribution due to correlation; (4) while QMC is currently limited to a single-band effective-mass Hamiltonian, CI may be used with much more realistic models, which capture the correct symmetries and electronic structure of the dots, leading to qual. different predictions from

effective-mass models; and (5) CI gives excited state energies necessary to identify some of the peaks that appear in single-dot photoluminescence spectra.

IT 1306-24-7, Cadmium selenide, properties
 (correlation vs. mean-field contributions to excitons,
 multiexcitons, and charging energies in **semiconductor**
quantum dots)
 RN 1306-24-7 HCA
 CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST **semiconductor quantum** dot exciton correlation
 mean field contribution luminescence; cadmium selenide
quantum dot exciton correlation mean field luminescence;
 silicon **quantum** dot exciton correlation mean field
 luminescence

IT Biexciton
 Electron correlation
 Exciton
 Hamiltonian
 Luminescence
 Potential barrier
Quantum dot devices
Quantum transition
 Spin-orbit coupling
 (correlation vs. mean-field contributions to excitons,
 multiexcitons, and charging energies in **semiconductor**
quantum dots)

IT Passivation
 (surface; correlation vs. mean-field contributions to excitons,
 multiexcitons, and charging energies in **semiconductor**
quantum dots)

IT 1306-24-7, Cadmium selenide, properties 7440-21-3,
 Silicon, properties
 (correlation vs. mean-field contributions to excitons,
 multiexcitons, and charging energies in **semiconductor**
quantum dots)

L57 ANSWER 5 OF 25 HCA COPYRIGHT 2003 ACS

134:314174 Precipitation-hardenable sintered stainless steel
 microalloyed with S for machinability. Brown, Robert S.; Del Corso,
 Gregory J.; Kosa, Theodore; Martin, James W. (CRS Holdings, Inc.,
 USA). PCT Int. Appl. WO 2001031076 A1 20010503, 21 pp. DESIGNATED
 STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
 CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM,
 HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,
 LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD,
 SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA,

ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT; BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2.
APPLICATION: WO 2000-US28342 20001013. PRIORITY: US 1999-425664 19991022.

AB Sintered martensitic stainless steel typically manufd. by hot-isostatic pressing contains C .ltoreq.0.03, Mn .ltoreq.1.0, Si .ltoreq.0.75, S 0.010-0.050 (for machinability), Cr 10-14, Ni 6-12, Ti 0.4-2.5, Mo .ltoreq.6, B .ltoreq.0.010, Cu .ltoreq.4, Co .ltoreq.9, Nb .ltoreq.1, Al .ltoreq.1, Ta .ltoreq.2.5, N .ltoreq.0.03; and P .ltoreq.0.040%. The microstructure contains dispersed Ti sulfide particles having .ltoreq.5 .mu.m size. The stainless steel is preferably manufd. by melt atomizing with Ar, followed by filling a can with the powder, sealing, and hot-isostatically pressing at 2000-2100.degree. F. The sintered stainless steel contg. mainly Cr 11-12, Ni 8-10, Mo .ltoreq.0.50, Cu 1.5-2.6, Ti 1.0-1.5, and Nb 0.10-0.50% can be processed by: (a) soln. heat treatment for 0.25-2 h at 1400-1600.degree. F, followed by quenching for hardening; or (b) overaging heat treatment for .ltoreq.4 h at 1150.degree. F, followed by the billet trimming and cold drawing with annealing for wire manuf. The high-strength wire is suitable for manuf. of surgical needles.

IT 12673-92-6, Titanium sulfide
(pptd., stainless steel contg.; pptn.-hardenable sintered stainless steel microalloyed with S for machinability)

RN 12673-92-6 HCA

CN Titanium sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
S	x	7704-34-9
Ti	x	7440-32-6

IC ICM C22C033-02

ICS C22C038-60; C22C038-50; C21D006-02; C21D006-04

CC 55-4 (Ferrous Metals and Alloys)

Section cross-reference(s): 63

IT 12673-92-6, Titanium sulfide
(pptd., stainless steel contg.; pptn.-hardenable sintered stainless steel microalloyed with S for machinability)

L57 ANSWER 6 OF 25 HCA COPYRIGHT 2003 ACS

134:302431 Calculating the Influence of External Charges on the Photoluminescence of a CdSe Quantum Dot. Wang, Lin-Wang (NERSC Lawrence Berkeley National Laboratory, Berkeley, CA, 94720, USA). Journal of Physical Chemistry B, 105(12), 2360-2364 (English) 2001. CODEN: JPCBFK. ISSN: 1089-5647. Publisher: American Chemical Society.

AB The influence of external charges on the radiative recombination rate of an electron-hole pair in a CdSe quantum dot is

investigated via **atomistic** empirical pseudopotential calcns. It is found that, when a neg. external charge is near the surface of a CdSe **quantum** dot, its Coulomb potential could be strong enough to pull the hole away from the electron and results in a redn. of the radiative recombination rate by a factor of 70. Distance, direction, charge no., and charge type dependences of this effect are investigated.

IT 1306-24-7, Cadmium selenide (CdSe), properties
(**quantum** dot; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 65, 76

ST charge trapping recombination luminescence cadmium selenide **quantum** dot calcn; photoluminescence electron hole radiative recombination cadmium selenide **quantum** dot

IT **Quantum** dot devices
(calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

IT Pseudopotential
(calcn.; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

IT Luminescence quenching
(due to trapping of charges in the surrounding medium of cadmium selenide **quantum** dot)

IT Hole (electron)
Wave function
(electron and hole wave functions squares for cadmium selenide **quantum** dot)

IT Coulomb potential
(electron-hole; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

IT Luminescence
(intermittence of; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

IT Electron-hole recombination
(radiative; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

IT 183748-02-9, Electron
(electron and hole wave functions squares for cadmium selenide **quantum** dot)

IT 1306-24-7, Cadmium selenide (CdSe), properties
(**quantum** dot; calcg. influence of external charges on photoluminescence of cadmium selenide **quantum** dot)

134:138636 Correlation versus mean-field contributions to excitons, multi-excitons, and charging energies in **semiconductor quantum** dots. Shumway, J.; Franceschetti, A.; Zunger, Alex (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Los Alamos National Laboratory, Preprint Archive, Condensed Matter 1-15, arXiv:cond-mat/0012050 (English) 5 Dec 2000. CODEN: LNCMFR. URL: <http://xxx.lanl.gov/pdf/cond-mat/0012050> Publisher: Los Alamos National Laboratory.

AB Single-dot spectroscopy is now able to resolve the energies of excitons, multi-excitons, and charging of **semiconductor quantum** dots with .ltorsim. 1 meV resoln. the authors discuss the phys. content of these energies and show how they can be calcd. via **Quantum** Monte Carlo (QMC) and CI methods. The spectroscopic energies have 3 pieces: (i) a perturbative part re reflecting carrier-carrier direct and exchange Coulomb energies obtained from fixed single-particle orbitals, (ii) a self-consistency correction when the single particle orbitals are allowed to adjust to the presence of carrier-carrier interaction, and (iii) a correlation correction. the authors 1st apply the QMC and CI methods to a model single-particle Hamiltonian: a spherical dot with a finite barrier and single-band effective mass. This allows one to test the convergence of the CI and to establish the relative importance of the 3 terms (i)(iii) above. Next, the authors apply the CI method to a realistic single-particle Hamiltonian for a CdSe dot, including via a pseudopotential description the **atomistic** features, multi-band coupling, spin-orbit effects, and surface passivation. The authors include all bound states (up to 40,000 Slater determinants) in the CI expansion. Study shows that: (1) typical exciton transition energies, which are .apprx.1 eV, can be calcd. to better than 95% by perturbation theory, with only a .apprx. 2 meV correlation correction; (2) typical electron addn. energies are .apprx.40 meV, of which correlation contributes very little (.apprx. 1 meV); (3) typical biexciton binding energies are pos. and .apprx. 10 meV and almost entirely due to correlation energy, and exciton addn. energies are .apprx.30 meV with nearly all contribution due to correlation; (4) while QMC is currently limited to a single-band effective mass Hamiltonian, CI may be used with much more realistic models, which capture the correct symmetries and electronic structure of the dots, leading to qual. different predictions than effective mass models; and (5) and CI gives excited state energies necessary to identify some of the peaks that appear in single-dot photoluminescence spectra.

IT 1306-24-7, Cadmium selenide, properties
(correlation vs. mean-field contributions to excitons,
multi-excitons, and charging energies in **semiconductor quantum** dots)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

- CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 65
- ST **quantum** dot exciton electron correlation mean field luminescence; cadmium selenide **quantum** dot exciton correlation mean field luminescence; CI **quantum** dot exciton electron correlation mean field luminescence; Monte Carlo **quantum** dot exciton correlation mean field luminescence; surface passivation **quantum** dot exciton correlation mean field luminescence; electronic structure **quantum** dot exciton correlation mean field luminescence; spin orbit **quantum** dot exciton correlation mean field luminescence; Hamiltonian **quantum** dot exciton electron correlation mean field luminescence; biexciton **quantum** dot exciton electron correlation mean field luminescence
- IT Simulation and Modeling, physicochemical
(Monte Carlo; correlation vs. mean-field contributions to excitons, multi-excitons, and charging energies in **semiconductor quantum** dots)
- IT Biexciton
CI (configuration interaction)
Correlation energy
Electron correlation
Electronic structure
Exciton
Hamiltonian
Luminescence
Passivation
Quantum dot devices
Spin-orbit coupling
(correlation vs. mean-field contributions to excitons, multi-excitons, and charging energies in **semiconductor quantum** dots)
- IT 1306-24-7, Cadmium selenide, properties
(correlation vs. mean-field contributions to excitons, multi-excitons, and charging energies in **semiconductor quantum** dots)
- L57 ANSWER 8 OF 25 HCA COPYRIGHT 2003 ACS
- 133:65398 Laser photoionization spectroscopy of the zinc atom and the study of zinc sulfide evaporation. Tukhlibaev, O.; Alimov, U. Zh. (Navoi State University, Samarkand, 703004, Uzbekistan). Optics and Spectroscopy (Translation of Optika i Spektroskopiya), 88(4), 506-509 (English) 2000. CODEN: OPSUA3. ISSN: 0030-400X. Publisher: MAIK Nauka/Interperiodica.
- AB The frequencies of 5s 3S1 - np 3P1 Rydberg transitions, **quantum** defects for n = 15-50, and energies of high-lying P states of the Zn atom were measured by 3-step laser excitation with subsequent ionization by a pulsed elec. field. Free Zn atoms were produced through effusion of Zn vapor from an **atomizer** during the thermal dissociation of ZnS mols. The evaporation kinetics was

studied, and the ZnS vapor pressure was measured by the detection of photoionic signals of Zn.

IT 1314-98-3, Zinc sulfide, properties
(laser photoionization spectroscopy of zinc atom and study of zinc sulfide evapn.)
RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 73-4 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
ST laser photoionization zinc sulfide **quantum** defect
IT Dissociation
Dissociative **atomizers**
Dye lasers
Electrooptical effect
Evaporation
Photoionization
Quantum defect
Rydberg state
Vapor pressure

(laser photoionization spectroscopy of zinc atom and study of zinc sulfide evapn.)
IT 1314-98-3, Zinc sulfide, properties 7440-66-6, Zinc, properties
(laser photoionization spectroscopy of zinc atom and study of zinc sulfide evapn.)

L57 ANSWER 9 OF 25 HCA COPYRIGHT 2003 ACS

132:286816 Addition energies and quasiparticle gap of CdSe nanocrystals. Franceschetti, Alberto; Zunger, Alex (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Applied Physics Letters, 76(13), 1731-1733 (English) 2000. CODEN: APPLAB. ISSN: 0003-6951. Publisher: American Institute of Physics.

AB Using **atomistic** pseudopotential wave functions we calc. the quasiparticle gap, the optical gap and the electron and hole addn. energies of CdSe nanocrystals. We find that the quasiparticle gap and the addn. energies depend strongly on the dielec. const. of the surrounding material, while the optical gap is rather insensitive to the environment. We provide scaling laws for these quantities as a function of the **quantum** dot size, and compare our results with recent scanning tunneling spectroscopy expts.

IT 1306-24-7, Cadmium monoselenide, properties
(addn. energies and quasiparticle gap of CdSe nanocrystals)

RN 1306-24-7 HCA
CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd—Se

CC 76-2 (Electric Phenomena)
 IT 1306-24-7, Cadmium monoselenide, properties
 (addn. energies and quasiparticle gap of CdSe nanocrystals)

L57 ANSWER 10 OF 25 HCA COPYRIGHT 2003 ACS

130:74378 Short-range versus long-range electron-hole exchange interactions in **semiconductor quantum** dots. Franceschetti, A.; Wang, L. W.; Fu, H.; Zunger, A. (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Physical Review B: Condensed Matter and Materials Physics, 58(20), R13367-R13370 (English) 1998. CODEN: PRBMDO. ISSN: 0163-1829. Publisher: American Physical Society.

AB Using a many-body approach based on **atomistic** pseudopotential wave functions we show that the electron-hole exchange interaction in **semiconductor quantum** dots is characterized by a large, previously neglected long-range component, originating from monopolar interactions of the transition d. between different unit cells. The calcd. electron-hole exchange splitting of CdSe and InP nanocrystals is in good agreement with recent exptl. measurements.

IT 1306-24-7, Cadmium monoselenide, properties
 (electron-hole exchange splitting of CdSe and InP nanocrystals)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 76-3 (Electric Phenomena)
 ST electron hole exchange interaction **semiconductor quantum** dot

IT Electron-hole recombination
 Exchange interaction
 Quantum dot devices
 Semiconductor devices

(short-range vs. long-range electron-hole exchange interactions in **semiconductor quantum** dots)

IT 1306-24-7, Cadmium monoselenide, properties 22398-80-7,
 Indium monophosphide, properties
 (electron-hole exchange splitting of CdSe and InP nanocrystals)

L57 ANSWER 11 OF 25 HCA COPYRIGHT 2003 ACS

129:237130 High-Energy Excitonic Transitions in CdSe **Quantum** Dots. Wang, Lin-Wang; Zunger, Alex (National Renewable Energy Laboratory, Golden, CO, 80401, USA). Journal of Physical Chemistry B, 102(34), 6449-6454 (English) 1998. CODEN: JPCBFK. ISSN: 1089-5647. Publisher: American Chemical Society.

AB An **atomistic** direct diagonalization pseudopotential approach was used to analyze the optical excitation spectra of CdSe **quantum** dots for .ltoreq.1.5 eV about the band gap. Agreement is obtained with expt. for all the 8 excitonic

transitions, without resorting to fitting to the exptl. data on dots. The obsd. excitonic transitions are identified in terms of specific pairs of valence and conduction single-particle states. For the lowest few transitions, the assignments agree with the conventional k.p effective-mass result, but this is not the case for the higher peaks. In the **atomistic** approach, many more valence states exist within a given energy range than in the continuum k.p approach. The mixing of even and odd angular momentum symmetry, disallowed in the contemporary simple k.p models, is actually permitted in the more general **atomistic** approach.

IT 1306-24-7, Cadmium selenide, properties
 (high-energy excitonic transitions in **quantum** dots of)
 RN 1306-24-7 HCA
 CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 76

ST excitonic transition cadmium selenide **quantum** dot

IT **Quantum** transition
 (excitonic, high-energy; in cadmium selenide **quantum** dots)

IT **Quantum** dot devices
 (high-energy excitonic transitions in cadmium selenide)

IT Band gap
 Pseudopotential
 (high-energy excitonic transitions in cadmium selenide **quantum** dots in relation to)

IT Exciton
 Luminescence
 (high-energy transitions in cadmium selenide **quantum** dots)

IT 1306-24-7, Cadmium selenide, properties
 (high-energy excitonic transitions in **quantum** dots of)

L57 ANSWER 12 OF 25 HCA COPYRIGHT 2003 ACS

129:235861 Ab initio relativistic pseudopotential study of small silver and gold sulfide clusters (M₂S)_n, n=1 and 2. Bagatur'yants, Alexander A.; Safonov, Andrei A.; Stoll, Hermann; Werner, Hans-Joachim (Photochemistry Center, Russian Academy of Sciences, ul. Novatorov 7a, Moscow, 117421, Russia). Journal of Chemical Physics, 109(8), 3096-3107 (English) 1998. CODEN: JCPA6. ISSN: 0021-9606. Publisher: American Institute of Physics.

AB Small **semiconductor** silver and gold sulfide clusters (Ag₂S)_n and (Au₂S)_n, n=1,2, are studied by valence ab initio calcs. with the inclusion of electron correlation at the second-order perturbation theory (MP2) and coupled-cluster [CCSD and CCSD(T)] levels. Various relativistic and nonrelativistic pseudopotentials are employed to describe the effects of core electrons. Correlation

and relativistic effects are essential in detg. the geometry and relative stability of monomer and dimer structures. Relativistic effects result in a notable decrease in the calcd. interat. distances, which is esp. significant in the case of gold sulfide structures (up to 10%). Correlation effects markedly increase the stability of compact structures with an increased no. of relatively short M...M contacts (M...M distances of about 280-330 pm). Excluding the correlation of lower-lying valence orbitals (sulfur 3s and silver 4d or gold 5d) results in completely opposite predictions. This fact suggests that the effects of d-d and d-outer valence (metal ns and sulfur 3p) electron correlation give rise to attractive short-range interactions of an intramol. van der Waals type, which det. the increased stability of more compact cluster structures. However, large-core pseudopotentials strongly exaggerate this effect in the case of gold and give results rather different from those obtained with more valid and accurate small-core pseudopotentials. The reason for this deficiency lies in the nature of pseudopotentials themselves rather than in basis set shortcomings. The **atomization** and dissocn. energies, equil. geometrical parameters, dipole moments, and Mulliken populations are calcd. and discussed.

IT 1303-60-2, Gold sulfide (Au₂S) 21548-73-2, Silver sulfide (Ag₂S) 212713-45-6, Silver sulfide (Ag₄S₂) 212713-46-7, Gold sulfide (Au₄S₂)
 (ab initio relativistic pseudopotential study of small silver and gold sulfide clusters (M₂S)_n, n=1 and 2)

RN 1303-60-2 HCA
 CN Gold sulfide (Au₂S) (6CI, 8CI, 9CI) (CA INDEX NAME)

Au-S-Au

RN 21548-73-2 HCA
 CN Silver sulfide (Ag₂S) (8CI, 9CI) (CA INDEX NAME)

Ag-S-Ag

RN 212713-45-6 HCA
 CN Silver sulfide (Ag₄S₂) (9CI) (CA INDEX NAME)

CM 1

CRN 21548-73-2
 CMF Ag₂ S

Ag-S-Ag

RN 212713-46-7 HCA
 CN Gold sulfide (Au₄S₂) (9CI) (CA INDEX NAME)

CM 1

CRN 1303-60-2

CMF Au2 S

Au-S-Au

CC 65-5 (General Physical Chemistry)

Section cross-reference(s): 76

IT Basis sets

Bond angle

Bond length

CCSD (molecular orbital)

CCSDT (molecular orbital)

Cluster structure

Dimerization enthalpy

Dipole moment

Dissociation energy

Electron configuration

Electron correlation

Isomers

MP2 (Moller-Plesset)

Pseudopotential

Relativistic quantum chemistry

Semiconductor materials

Vibrational frequency

(ab initio relativistic pseudopotential study of small silver and gold sulfide clusters (M₂S)_n, n=1 and 2)

IT 1303-60-2, Gold sulfide (Au₂S) 21548-73-2, Silver sulfide (Ag₂S) 212713-45-6, Silver sulfide (Ag₄S₂) 212713-46-7, Gold sulfide (Au₄S₂)

(ab initio relativistic pseudopotential study of small silver and gold sulfide clusters (M₂S)_n, n=1 and 2)

L57 ANSWER 13 OF 25 HCA COPYRIGHT 2003 ACS

129:68887 Coatings absorbing solar energy. Hugo, Gerd (Hugo, Gerd, Germany). Ger. Offen. DE 19650300 A1 19980610, 8 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1996-19650300 19961204.

AB The title coatings, with low IR emission at 8-14 .mu.m, contain binders with transparency .gtoreq.30% at 0.35-0.7 .mu.m and .gtoreq.20% at 5-25 .mu.m, **particles** reflecting or scattering IR at 5-25 .mu.m, **particles** reflecting or scattering light at 0.35-0.7 .mu.m but transmitting .gtoreq.20% light at 5-25 .mu.m, and **particles** which are elec. conductors and absorb <80% IR at 5-25 .mu.m. A mixt. of H₂O 320, pigment-polymer emulsion (Ropaque OP-62) 300, styrene-acrylate dispersion (Mowilith DM 611) 300, oxidized polyethylene 120, elec. conductive pigment (Sacon P 401) 70, Sachtolith L 650, Al flakes 70, and additives 15 g gave a coating with reflectance (0.35-0.5 .mu.m) 78%, absorption (0.7-2.5 .mu.m) 40%, and emission (8-14 .mu.m) 53%.

IT 12169-28-7, Zinc blende
(micronized; pigments for coatings absorbing solar energy)

RN 12169-28-7 HCA

CN Sphalerite (ZnS) (9CI) (CA INDEX NAME)

S= Zn

IT 1314-98-3, Zinc sulfide, uses
(pigments for coatings absorbing solar energy)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S= Zn

IC ICM C09D005-32

ICS C09D201-00; C09D005-38; C09D017-00; C09D005-36; B05D007-16;
E04F013-02

ICA C09D005-02; C09D133-00; C09D123-14; C09D123-06; C09D123-30;
C09D123-08; C09D133-06; C09D139-06; C09D123-22; C09D123-34;
C09D125-16; C09D193-00; C09D179-08

CC 42-5 (Coatings, Inks, and Related Products)

IT Carbon black, uses

(micronized; pigments for coatings absorbing solar energy)

IT 12169-28-7, Zinc blende

(micronized; pigments for coatings absorbing solar energy)

IT 1314-98-3, Zinc sulfide, uses 1314-98-3,

Sachtolith L, uses 7440-36-0, Antimony, uses 141256-11-3, Saccon
P 401

(pigments for coatings absorbing solar energy)

L57 ANSWER 14 OF 25 HCA COPYRIGHT 2003 ACS

128:42858 Manufacture of metal sulfide particles by **spray**
thermal decomposition method. Lenggoro, I. Wuled (Fac. Eng.,
Hiroshima Univ., Japan). Kemikaru Enjiniyaringu, 42(11), 856-860
(Japanese) 1997. CODEN: KEENAT. ISSN: 0387-1037. Publisher:
Kagaku Kogyosha.

AB A review with 5 refs. This review describes (1) a process of
manufg. (a) **micron** or submicron **particles** of
zinc sulfide (ZnS), cadmium sulfide (CdS), and ZnS-CdS solid soln.
by **ultrasonic spray** pyrolysis and (b)
nano order **particles** of ZnS and CdS by
electrostatic **spray** pyrolysis, (3) the effect of exptl.
conditions on cryst. property, shapes, and fluorescent property of
micro particles, and (4) its typical manufg. app. Metal sulfide
particles are prep'd. by **spray** pyrolysis of a soln. of
metal nitrate-thiourea complexes $M[SC(NH_2)_2]_2(NO_3)_2$ ($M = Zn, Cd$).
Cryst. property, size, and shape of particles can be controlled by

changing operational conditions. Although functional **microparticles** of .ltoreq.0.1 .mu.m are relatively easily formed using the electrostatic **spray** pyrolysis, there still remains a problem of slow prodn. speed which awaits for future process evaluation and improvement by theor. anal. based on relationship between shapes and properties of formed particles and the process.

IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
 , Zinc sulfide, preparation 12442-27-2P, Cadmium zinc sulfide
 (manuf. of metal sulfide particles by **spray** thermal decompn. method)
 RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA
 CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

RN 12442-27-2 HCA
 CN Cadmium zinc sulfide ((Cd,Zn)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0 - 1	7440-66-6
Cd	0 - 1	7440-43-9

CC 78-0 (Inorganic Chemicals and Reactions)
 ST metal sulfide particle manuf review; **spray** thermal decompn sulfide prepn review; thiourea metal nitrate complex pyrolysis review
 IT Sulfides, preparation
 (manuf. of metal sulfide particles by **spray** thermal decompn. method)
 IT Calcination
 (**spray**, **ultrasonic** or electrostatic; manuf. of metal sulfide particles by **spray** thermal decompn. method)
 IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
 , Zinc sulfide, preparation 12442-27-2P, Cadmium zinc sulfide
 (manuf. of metal sulfide particles by **spray** thermal decompn. method)

- 127:337009 Extension of Gaussian-2 (G2) theory to molecules containing third-row atoms K and Ca. Blaudeau, Jean-Philippe; McGrath, Mark P.; Curtiss, Larry A.; Radom, Leo (Chemical Technology/Materials Science Division, Argonne National Laboratory, Argonne, IL, 60439, USA). Journal of Chemical Physics; 107(13), 5016-5021 (English) 1997. CODEN: JCPSA6. ISSN: 0021-9606. Publisher: American Institute of Physics.
- AB Gaussian-2 (G2) theory has been extended to mols. contg. the third-row nontransition elements K and Ca. Basis sets compatible with those used in G2 theory for mols. contg. first- and second-row atoms, as well as the third-row elements Ga-Kr, have been derived. As for Ga-Kr, first-order spin-orbit corrections are included explicitly in the G2 energies of K- and Ca-contg. atoms and mols. In contrast to the procedure for Ga-Kr, the 3s and 3p orbitals need to be included in the correlation space for K- and Ca-contg. mols. The geometries obtained with the new basis sets are in satisfactory agreement with expt. Assessment of the thermochem. predictions is limited because of the sparsity of accurate exptl. data for mols. contg. K and Ca. Ionization energies are generally in good agreement with exptl. values, as are the **atomization** energies for K-contg. mols. However, there are larger differences between theor. and exptl. **atomization** energies for Ca-contg. mols.
- IT 20548-54-3, Calcium sulfide (CaS)
(extension of Gaussian-2 (G2) theory to mols. contg. third-row atoms K and Ca)
- RN 20548-54-3 HCA
- CN Calcium sulfide (CaS) (9CI) (CA INDEX NAME)
- Ca=S
- CC 65-5 (General Physical Chemistry)
- ST extension Gaussian2 theory potassium calcium mol; G2 theory extension third row atom; thermochem property geometry potassium calcium mol; ionization **atomization** energy potassium calcium mol; basis set potassium calcium G2 extension; spin orbit potassium calcium G2 extension
- IT Atomic orbital
Atomization enthalpy
Basis sets
Bond angle
Bond length
Electron affinity
Energy
Ionization potential
MP2 (Moller-Plesset)
MP4 (Moller-Plesset)
Molecular orbital
Molecular structure
QCISD(T) (molecular orbital)
Quantum chemistry

Spin-orbit coupling

Thermodynamics

Total energy

(extension of Gaussian-2 (G2) theory to mols. contg. third-row atoms K and Ca)

- IT 1305-78-8, Calcium oxide (CaO), properties 1310-58-3, Potassium hydroxide (KOH), properties 7440-09-7, Potassium, properties 7440-70-2, Calcium, properties 7447-40-7, Potassium chloride (KCl), properties 7693-26-7, Potassium Hydride 7758-02-3, Potassium bromide (KBr), properties 7789-23-3, Potassium fluoride (KF) 7789-75-5, Calcium fluoride (CaF₂), properties 10043-52-4, Calcium chloride (CaCl₂), properties 12177-67-2, Calcium hydroxide (CaOH) 13827-26-4, Calcium fluoride (CaF) 14102-48-8, Calcium(1+), properties 14452-75-6, Calcium hydride (CaH) 15606-71-0, Calcium chloride (CaCl) 19128-96-2, Potassium(1-), properties **20548-54-3**, Calcium sulfide (CaS) 23336-23-4 24203-36-9, Potassium(1+), properties 25681-80-5, Potassium cluster (K₂), properties 146527-39-1
(extension of Gaussian-2 (G2) theory to mols. contg. third-row atoms K and Ca)

L57 ANSWER 16 OF 25 HCA COPYRIGHT 2003 ACS

126:173785 Preparation of ZnS and CdS fine particles with different particle sizes by a **spray**-pyrolysis method. Okuyama, Kikuo; Lenggoro, I. Wuled; Tagami, Norikazu; Tamaki, Shinkichi; Tohge, Noboru (Dep. of Chemical Engineering, Hiroshima University, Higashi-Hiroshima, 739, Japan). Journal of Materials Science, 32(5), 1229-1237 (English) 1997. CODEN: JMTSAS. ISSN: 0022-2461. Publisher: Chapman & Hall.

AB In the prepn. of ZnS and CdS fine particles by an **ultrasonic spray**-pyrolysis method, the particle size was changed from submicrometer to **micrometer size** by changing the concn. of the metal nitrates in the starting aq. soln. contg. Zn(NO₃)₂ or Cd(NO₃)₂ and SC(NH₂)₂. The effects of temp. profile in the reactor furnace on the properties of prepd. particles were also investigated by varying the temp. profiles (const. and increasing temp. distributions). The vol. mean diam. of the prepd. particles was approx. proportional to the one-third power of the concn. of the metal nitrates in the soln. The cryst. phase and fluorescence properties of ZnS and CdS particles did not depend on the particle size.

IT **1306-23-6P**, Cadmium sulfide, preparation **1314-98-3P**, Zinc sulfide, preparation

(prepn. of zinc sulfide and cadmium sulfide fine particles with different particle sizes by **spray** pyrolysis method)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 49-5 (Industrial Inorganic Chemicals)

ST zinc sulfide particle prepn **spray** pyrolysis; cadmium sulfide particle prepn **spray** pyrolysis

IT 62-56-6, Thiourea, uses 7779-88-6, Zinc nitrate 10325-94-7, Cadmium nitrate (in prepn. of zinc sulfide and cadmium sulfide fine particles with different particle sizes by **spray** pyrolysis method)

IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P, Zinc sulfide, preparation (prepn. of zinc sulfide and cadmium sulfide fine particles with different particle sizes by **spray** pyrolysis method)

L57 ANSWER 17 OF 25 HCA COPYRIGHT 2003 ACS

124:183475 Preparation of fine particles of ZnS-CdS solid solution by the **spray**-pyrolysis. Tmaaki, Shinkichi; Tohge, Noboru; Tagami, Keiichi; Okuyama, Kikuo (Dep. Industrial Eng., Kinki Univ., Osaka, 577, Japan). Journal of the Ceramic Society of Japan, 104(Feb.), 137-9 (English) 1996. CODEN: JCSJEW. Publisher: Ceramic Society of Japan.

AB **Ultrasonic spray** pyrolysis method was applied to the prepn. of fine particles of solid soln. in the system ZnS-CdS. An aq. soln. of zinc nitrate, cadmium nitrate and thiourea was used as a starting soln. Morphol. and crystallinity of the produced particles were examd. as a function of prepn. conditions and their compn. Spherical particles of a hexagonal phase were obtained by the pyrolysis at around 700.degree.C. The size of the obtained particles was distributed in the range from 0.3 to 1.5 .mu .m; each **particle** was found to consist of much finer crystallites. Lattice consts. of the particles varied linearly with the compn., showing that solid soln. particles were formed in the whole compn. range of ZnS-CdS.

IT 1306-23-6DP, Cadmium sulfide (CdS), solid solns. with zinc sulfide 1314-98-3DP, Zinc sulfide (ZnS), solid solns. with cadmium sulfide 12442-27-2P, Cadmium zinc sulfide (cd,zn)s 39466-56-3P, Cadmium zinc sulfide cd0.5zn0.5s 106830-00-6P, Cadmium zinc sulfide cd0.8zn0.2s 107103-14-0P, Cadmium zinc sulfide cd0.3zn0.7s 107121-63-1P, Cadmium zinc sulfide cd0.1zn0.9s 108216-70-2P, Cadmium zinc sulfide cd0.7zn0.3s 108216-71-3P, Cadmium zinc sulfide cd0.9zn0.1s 108424-76-6P, Cadmium zinc sulfide cd0.6zn0.4s 109676-64-4P, Cadmium zinc sulfide cd0.4zn0.6s 111705-84-1P, Cadmium zinc sulfide cd0.2zn0.8s (powder; properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

$\text{Cd}=\text{S}$

RN 1314-98-3 HCA
 CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

$\text{S}=\text{Zn}$

RN 12442-27-2 HCA
 CN Cadmium zinc sulfide ((Cd,Zn)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Zn	0 - 1	7440-66-6
Cd	0 - 1	7440-43-9

RN 39466-56-3 HCA
 CN Cadmium zinc sulfide (CdZnS₂) (7CI, 9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	2	7704-34-9
Zn	1	7440-66-6
Cd	1	7440-43-9

RN 106830-00-6 HCA
 CN Cadmium zinc sulfide (Cd_{0.8}Zn_{0.2}S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Zn	0.2	7440-66-6
Cd	0.8	7440-43-9

RN 107103-14-0 HCA
 CN Cadmium zinc sulfide (Cd_{0.3}Zn_{0.7}S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Zn	0.7	7440-66-6
Cd	0.3	7440-43-9

RN 107121-63-1 HCA
 CN Cadmium zinc sulfide (Cd0.1Zn0.9S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.9	7440-66-6
Cd	0.1	7440-43-9

RN 108216-70-2 HCA
 CN Cadmium zinc sulfide (Cd0.7Zn0.3S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.3	7440-66-6
Cd	0.7	7440-43-9

RN 108216-71-3 HCA
 CN Cadmium zinc sulfide (Cd0.9Zn0.1S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.1	7440-66-6
Cd	0.9	7440-43-9

RN 108424-76-6 HCA
 CN Cadmium zinc sulfide (Cd0.6Zn0.4S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.4	7440-66-6
Cd	0.6	7440-43-9

RN 109676-64-4 HCA
 CN Cadmium zinc sulfide (Cd0.4Zn0.6S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.6	7440-66-6
Cd	0.4	7440-43-9

RN 111705-84-1 HCA
 CN Cadmium zinc sulfide (Cd0.2Zn0.8S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0.8	7440-66-6
Cd	0.2	7440-43-9

CC 57-2 (Ceramics)

ST cadmium zinc sulfide prepn **spray** pyrolysis

IT Crystal structure

Particle size

(properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

IT Calcination

(**spray**, **ultrasonic**; properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

IT 62-56-6, Thiourea, processes

(complexation agent; properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

IT 1306-23-6DP, Cadmium sulfide (CdS), solid solns. with zinc sulfide 1314-98-3DP, Zinc sulfide (ZnS), solid solns. with cadmium sulfide 12442-27-2P, Cadmium zinc sulfide (cd,zn)s

39466-56-3P, Cadmium zinc sulfide cd0.5zn0.5s

106830-00-6P, Cadmium zinc sulfide cd0.8zn0.2s

107103-14-0P, Cadmium zinc sulfide cd0.3zn0.7s

107121-63-1P, Cadmium zinc sulfide cd0.1zn0.9s

108216-70-2P, Cadmium zinc sulfide cd0.7zn0.3s

108216-71-3P, Cadmium zinc sulfide cd0.9zn0.1s

108424-76-6P, Cadmium zinc sulfide cd0.6zn0.4s

109676-64-4P, Cadmium zinc sulfide cd0.4zn0.6s

111705-84-1P, Cadmium zinc sulfide cd0.2zn0.8s

(powder; properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

IT 7779-88-6, Zinc nitrate 10325-94-7, Cadmium nitrate

(precursor; properties of ZnS-CdS solid soln. powder prepd. by **spray** pyrolysis of zinc nitrate-cadmium nitrate-thiourea mixts.)

L57 ANSWER 18 OF 25 HCA COPYRIGHT 2003 ACS

109:233558 Manufacture of dense metal oxide and metal sulfide particles.

Lilley, Edward (Corning Glass Works, USA). Eur. Pat. Appl. EP

285339 A1 19881005, 26 pp. DESIGNATED STATES: R: DE, FR, GB.

(English). CODEN: EPXXDW. APPLICATION: EP 1988-302667 19880325.

PRIORITY: US 1987-33411 19870401.

AB Dense metal oxide and metal sulfide particles having spherical shape and mean diam. $\leq 1 \mu\text{m}$ are produced from precursor solns. by the evapn. decompn. technique. The process includes: (1) providing a liq. based precursor of the ceramic, metal oxide, or metal sulfide

consisting of a concd. soln. of a solid active ingredient in a liq. carrier medium, (2) generating droplets of the precursor with a mean diam. of .ltoreq.3 .mu.m, (3) heating the droplets at .gtoreq.400.degree. to remove substantial portion of the carrier medium from the droplets, and (4) converting the solid active ingredient to ceramic, metal oxide, or metal sulfides in the form of solid spherical particles with a mean diam. of .ltoreq.1 .mu.m. Thus, $\text{Al}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$ was used as the active ingredient and water, as the carrier medium. Using Ar as the **atomizing** gas, the precursor droplets (mean diam. 0.2 .mu.m) contg. the active ingredients were produced and fed to the hot zone of a furnace maintained at 1000.degree.. The powder collected from the furnace was analyzed. The particles were spherical in shape and had a mean diam. of <1 .mu.m.

IT 12032-36-9P, Magnesium sulfide 12673-92-6P,
Titanium sulfide 21109-95-5P, Barium sulfide
37244-09-0P, Zirconium sulfide
(microfine particles of, prepn. of)
RN 12032-36-9 HCA
CN Magnesium sulfide (MgS) (6CI, 8CI, 9CI) (CA INDEX NAME)

Mg=S

RN 12673-92-6 HCA
CN Titanium sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	x	7704-34-9
Ti	x	7440-32-6

RN 21109-95-5 HCA
CN Barium sulfide (BaS) (7CI, 9CI) (CA INDEX NAME)

Ba=S

RN 37244-09-0 HCA
CN Zirconium sulfide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	x	7704-34-9
Zr	x	7440-67-7

IC ICM C01B013-34
CC 48-3 (Unit Operations and Processes)
Section cross-reference(s): 49, 57
ST metal oxide sulfide **microparticle** prepn

IT 1304-28-5P, preparation 1309-48-4P, Magnesia, preparation
 1314-23-4P, Zirconia, preparation 1314-36-9P, Yttria, preparation
 1344-28-1P, Alumina, preparation 7631-86-9P, Silica, preparation
 11116-22-6P, Yttrium sulfide **12032-36-9P**, Magnesium
 sulfide **12673-92-6P**, Titanium sulfide 13463-67-7P,
 Titania, preparation **21109-95-5P**, Barium sulfide
 37196-22-8P, Aluminum sulfide **37244-09-0P**, Zirconium
 sulfide
 (microfine particles of, prepn. of)

L57 ANSWER 19 OF 25 HCA COPYRIGHT 2003 ACS

102:159680 Analysis of mineral suspensions by d.c. plasma emission
 spectrometry. Derie, R. (Dep. Ore Dressing, Univ. Libre Bruxelles,
 Brussels, B-1050, Belg.). Analytica Chimica Acta, 166, 61-9
 (English) 1984. CODEN: ACACAM. ISSN: 0003-2670.

AB Dil. aq. suspensions of sub-sieve fractions of various minerals were
 analyzed for their major constituents by d.c. plasma emission
 spectrometry. In favorable cases (e.g., detn. of Zn in sphalerite
 or smithsonite **powders** <5 .mu.m), the
 suspensions can be analyzed quant. by comparison with std. solns.,
 and with a relative error <10%. In other cases (e.g., detn. of Be
 in beryl **powders**), the required element is so poorly
atomized that the anal. is impossible, even when very
 fine-grained suspensions are used. As expected, the
atomization efficiency for a particular element decreases
 with increasing particle size, and with increasing free energy of
 formation of its oxide at high temps. The region extending along
 the vertical branch of the plasma is a convenient excitation zone
 for suspensions contg. elements that are difficult to
atomize but the high background in this region limits the
 anal. possibilities.

IT **12169-28-7**
 (zinc detn. in aq. suspensions of, by d.c. plasma emission
 spectrometry, relative **atomization** efficiency in)

RN 12169-28-7 HCA

CN Sphalerite (ZnS) (9CI) (CA INDEX NAME)

S==Zn

CC 79-6 (Inorganic Analytical Chemistry)

IT Minerals

(anal. of aq. suspensions of, by d.c. plasma emission
 spectrometry, particle-size dependence on **atomization**
 efficiency in)

IT Particle size

(in mineral aq. suspensions, in d.c. plasma emission
 spectrometric anal., **atomization** efficiency in relation
 to)

IT 1302-52-9

(aluminum and beryllium detn. in aq. suspensions of, by d.c.
 plasma emission spectrometry, relative **atomization**

- efficiencies in)
- IT 7429-90-5, analysis 7440-41-7, analysis
(detn. of, in aq. suspensions of beryl, relative
atomization efficiencies in d.c. plasma emission
spectrometric)
- IT 7440-31-5, analysis
(detn. of, in aq. suspensions of cassiterite, relative
atomization efficiencies in d.c. plasma emission
spectrometric)
- IT 7439-89-6, analysis
(detn. of, in aq. suspensions of columbotantalite and ferberite,
relative **atomization** efficiencies in d.c. plasma
emission spectrometric)
- IT 7440-03-1, analysis 7440-25-7, analysis
(detn. of, in aq. suspensions of columbotantalite, relative
atomization efficiencies in d.c. plasma emission
spectrometric)
- IT 7440-33-7, analysis
(detn. of, in aq. suspensions of ferberite, relative
atomization efficiencies in d.c. plasma emission
spectrometric)
- IT 7440-21-3, analysis
(detn. of, in aq. suspensions of silicon carbide, relative
atomization efficiencies in d.c. plasma emission
spectrometric)
- IT 7440-66-6, analysis
(detn. of, in aq. suspensions of smithsonite and sphalerite,
relative **atomization** efficiencies in d.c. plasma
emission spectrometric)
- IT 12178-48-2
(iron and niobium and tantalum detn. in aq. suspensions of, by
d.c. plasma emission spectrometry, relative **atomization**
efficiencies in)
- IT 13871-23-3
(iron and tungsten detn. in aq. suspensions of, by d.c. plasma
emission spectrometry, relative **atomization**
efficiencies in)
- IT 409-21-2, analysis
(silicon detn. in aq. suspensions of, in d.c. plasma emission
spectrometry, relative **atomization** efficiencies in)
- IT 1317-45-9
(tin detn. in aq. suspensions of, by d.c. plasma emission
spectrometry, relative **atomization** efficiencies in)
- IT 14476-25-6
(zinc detn. in aq. suspensions of, by d.c. plasma emission
spectrometry, relative **atomization** efficiencies in)
- IT 12169-28-7
(zinc detn. in aq. suspensions of, by d.c. plasma emission
spectrometry, relative **atomization** efficiency in)

electrophotographic purposes. Nishigaki, Yuji; Kasai, Masanao; Okano, Kazumi (Canon K. K., Japan). Ger. Offen. DE 3035298 19810402, 22 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1980-3035298 19800918.

- AB For electrophotog. materials of improved moisture-resistivity, charge transfer, and low fatigue during continued use, the surface of photoconductive CdS is coated with a 1-20 nm film (which may be discontinuous) of hydroxides, oxides, or sulfides of a metal, such as Cd, In, Al, or Zn, or with GeO₂ or SiO₂, by vacuum coating, **atomization**, lamination, or, preferably by chem. reaction. The CdS is coated with 5-20% of a polymeric binder as 10-50 .mu. photoconductive layer on an elec. conductive support and covered with an insulating polymeric film. Thus, CdS with a Cd(OH)₂ surface was obtained by stirring Cu-doped 4 .mu. CdS **powder** 30 g in a soln. of CdSO₄.8/3 H₂O 77 mg in water 100 mL, then dropping in a 6 .times. 10-4M NaOH soln. 50 mL, maintaining a pH of 7-9. After an addnl. 10 min of stirring and 10 min of settling, the decanted CdS was washed 3 times with water, filtered, and dried 20 h at 60.degree.. It was coated with a vinyl chloride-acetate copolymer (Union Carbide VMCH) 12% as 40 .mu. layer on a 50 .mu. Al foil and covered with a 25 .mu. polyester film. The material was electrophotog. superior to one contg. untreated CdS.
- IT 1314-98-3, uses and miscellaneous
(coatings, surface, on cadmium sulfide electrophotog. photoconductor for improved properties)
- RN 1314-98-3 HCA
- CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S==Zn

- IT 1306-23-6, uses and miscellaneous
(electrophotog. photoconductor from surface-coated)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd==S

- IC G03G005-08
- CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic Processes)
- IT 1314-98-3, uses and miscellaneous 7631-86-9, uses and miscellaneous 12030-24-9 21645-51-2, uses and miscellaneous
(coatings, surface, on cadmium sulfide electrophotog. photoconductor for improved properties)
- IT 1306-23-6, uses and miscellaneous
(electrophotog. photoconductor from surface-coated)
- L57 ANSWER 21 OF 25 HCA COPYRIGHT 2003 ACS
- 90:214669 X-ray fluorimetric and atomic absorption spectrometric determination of traces of elements in the ng/ml range in aqueous

solutions after preconcentration by precipitate exchange reactions on thin metal sulfide layers. Disam, A.; Tschoepel, P.; Toelg, G. (Max-Planck-Inst. Metallforsch., Stuttgart, Fed. Rep. Ger.). Fresenius' Zeitschrift fuer Analytische Chemie, 295(2-3), 97-109 (German) 1979. CODEN: ZACFAU. ISSN: 0016-1152.

AB A preconcn. method by ppt. exchange on thin sulfide layers was described for detg. very low levels of Hg, Ag, Cu, Bi, Pd, Cd, Sn, As, Se, Te, Zn, Co, and Ni in aq. solns. by x-ray fluorescence and at. absorption spectrometry (AAS). The aq. sample (0.1-6 L, pH 3-6) was filtered through a freshly prepd. homogeneous metal sulfide layer (e.g. ZnS, MnS, CuS, PbS, thickness: 300-400 nm) which is placed on a membrane filter (cellulose nitrate or PTFE, pore size .1 to .1 .mu.m). With the exception of As, the elements forming sparingly sol. sulfides with a lower soly. product than the corresponding sulfides of the layer were practically completely retained from the soln. The exchanged elements can be detd. either simultaneously directly on the filter by x-ray fluorescence spectrometry or sequentially after dissoln. of the ppt. in a small vol. of acid by AAS with electrothermal atomization. Detection limits in the ng/L range can be obtained. Calibration, interferences by concomitant elements, and quality grades of the multistage procedure are described, which can be recommended for the simultaneous and reliable detn. of traces of Hg, Ag, Cu, Bi, Pb, Cd, and Te in potable, surface, and snow-melting water.

IT 1314-98-3, uses and miscellaneous 1317-40-4
(in pptn. preconcn. of trace elements for at. absorption and x-ray fluorescence spectrometric detn.)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S= Zn

RN 1317-40-4 HCA

CN Copper sulfide (CuS) (8CI, 9CI) (CA INDEX NAME)

Cu= S

CC 79-6 (Inorganic Analytical Chemistry)
Section cross-reference(s): 61

IT 1314-87-0 1314-98-3, uses and miscellaneous
1317-40-4 18820-29-6

(in pptn. preconcn. of trace elements for at. absorption and x-ray fluorescence spectrometric detn.)

L57 ANSWER 22 OF 25 HCA COPYRIGHT 2003 ACS

88:201036 Composition for preparation of a photoconductor surface for use in electrophotography. Marlor, Guy Anthony (USA). U.S. US 4061599 19771206, 5 pp. (English). CODEN: USXXAM. APPLICATION: US 1976-655819 19760206.

- AB The photosensitive surface of an electrophotog. plate is prepd. by spraying an enamel slip completely devoid of natural and synthetic resins. The enamel slip is comprised of an inorg. photoconductor powder, such as CdS, a glass powder, both having av. **particle size** <10 . μ ., and a plurality of org. solvents as carrier vehicles, .gtoreq.1 of the solvents being selected to enhance **atomization** of the slip during spraying and .gtoreq.1 of the solvents being selected as a phys. suspension element for the solids. Thus, a good enamel slip can be prepd. by ball-milling a mixt. comprised of a photoconductor powder 240, a glass frit (.ltoreq.10 . μ .) 240, a fumed silica **powder** (0.2 . μ .) 5.6 g, lecithin 1.8, Bu acetate 160, iso-Pr alc. 70, and amyl acetate 60 mL. The fumed silica acts as a suspension agent and gives the material thixotropic properties. The lecithin is to prevent the formation of blemishes in the finished coating.
- IT **1306-23-6**, uses and miscellaneous
(enamel slip contg. glass powder, org. solvents, for electrophotog. photoconductor prepn.)
- RN 1306-23-6 HCA
- CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- IC G03G005-085
- NCL 252501000
- CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic Processes)
- IT **1306-23-6**, uses and miscellaneous
(enamel slip contg. glass powder, org. solvents, for electrophotog. photoconductor prepn.)
- L57 ANSWER 23 OF 25 HCA COPYRIGHT 2003 ACS
- 88:180281 Electrophotographic copies of silver films. (Coulter Information Systems, Inc.; USA). Neth. Appl. NL 7613943 19770617, 17 pp. (Dutch). CODEN: NAXXAN. APPLICATION: NL 1976-13943 19761215.
- AB An app. is sketched for the directional exposure of a charged electrophotog. film through a processed perforated Ag halide film, sepg. the films, powder- or liq.-developing the electrostatic latent images, and fixing directly or after transfer to a transparent receptor film. For an elec. anisotropic, panchromatic material with a **quantum** yield 100 times as high as conventional products, absorbing 15-30% of white light, 30 nm of In-Sn oxide is **atomized** onto a 1:25 . μ . polyester film to render it elec. conductive. High-purity CdS is a suitable photoconductor. Prior to charging the film to an extent in accordance with the Ag image d., the film is covered with a thin insulating layer of a hydrocarbon fluid (Exxon Isopar G) as protection against static, light scatter, and abrasion. The liq. can also be used to clean the film for reuse.

IT 1306-23-6, uses and miscellaneous
(photoconductor, for anisotropic elec. conductive, panchromatic
electrophotog. films)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

IC G03G015-22

CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic
Processes)

IT 1306-23-6, uses and miscellaneous
(photoconductor, for anisotropic elec. conductive, panchromatic
electrophotog. films)

L57 ANSWER 24 OF 25 HCA COPYRIGHT 2003 ACS

88:140550 Production of powdered brazing alloys by **atomization**
. Anikeev, E. F.; Kiparisov, S. S.; Mitin, B. S.; Chepelenko, V. N.
(USSR). Tsvetnye Metally (Moscow, Russian Federation) (7), 68-9
(Russian) 1977. CODEN: TVMTAX. ISSN: 0372-2929.

AB PSr15 [50946-92-4] powd. brazing alloy was prepd. by
atomization of Cu-10Ag-5P-10 wt.% Zn molten alloy into
water. The <50 .mu. powder fraction was
enriched in metals having high m.p. and low vapor pressures. With
increasing the molten stream diam. from 6 to 8 mm and superheating
from 100 to 300.degree., the Ag, P, and Zn losses increased and the
product yield decreased.

IT 50946-92-4P
(brazed, prepn. of, by **atomization**)

RN 50946-92-4 HCA

CN Copper alloy, base, Cu 79-81, Ag 14.5-15.5, P 4.8-5.23 (UNS C55284)
(9CI) (CA INDEX NAME)

Component	Component Percent	Component Registry Number
Cu	79 - 81	7440-50-8
Ag	14.5 - 15.5	7440-22-4
P	4.8 - 5.2	7723-14-0

CC 56-9 (Nonferrous Metals and Alloys)

ST copper silver braze **atomization**

IT **Atomization**
(of copper-silver alloy, in prepn. of braze)

IT Solders
(brazes, copper-silver alloy, prepn. of, by **atomization**
)

IT 50946-92-4P
(brazed, prepn. of, by **atomization**)

L57 ANSWER 25 OF 25 HCA COPYRIGHT 2003 ACS

82:132136 Photoconductive toner. Honjo, Satoru; Miyatuka, Hajime; Arai, Fuminori; Matsumoto, Seiji; Tamai, Yasuo (Fuji Photo Film Co., Ltd.). Ger. Offen. DE 2403640 19740801, 25 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1974-2403640 19740125.

AB Photoconductive toner particles are distributed 10-100 .mu. deep on a conductive support, charged in the dark, imagewise exposed to light, and the discharged particles are removed mech. (by an air blast). For high chargeability, photocond., and reusability spherical **particles**, 10-70 .mu. in diam., consisting of 2 or 3 phases, are used. Their center is preferably dye-sensitized ZnO, which as n-type photoconductor may be combined with phthalocyanines of the p-type. As an alternative, ceramic or heat-hardenable plastic centers may be coated with a photoconductor. The particles are coated with a surface layer, forming 10-90% of the diam., softening at 60-150.degree., capable of transmitting electrons and/or pos. holes of poly(vinylcarbazole) or other polymers or polymer mixts. sensitized with Lewis acids and/or sensitizing dyes. It may be **sprayed** onto the centers as powder fusable at 150-250.degree. in hot air. The toner particles may also contain more than one center. Thus, 25 .mu. centers were prepd. by **spray**-drying a dispersion of photoconductive ZnO 60, phthalocyanine 20, styrene-modified alkyd resin 20, a polyisocyanate crosslinking agent 5, and Eosin Y in BuOAc 5 parts, followed by insolubilization at 60.degree. during 24 hr. Of the powder 100 parts were dispersed in a soln. of poly(vinylcarbazole) 85 and trinitrofluorenone 15 (as sensitizer) in C6H6 400 parts. By gradual addn. of the dispersion to 2000 parts water with **ultrasonic** agitation, particles with a 10 .mu. sulfate layer were obtained, dark-adapted, and spread on an Al plate at 90 g/m2. After a +450 V corona charge a negligible dark decay and almost complete discharge by a green light exposure were obsd.

IT 1306-23-6, uses and miscellaneous
(electrophotographic photoconductive toner contg.)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S.

IC G03G
CC 74-3 (Radiation Chemistry, Photochemistry, and Photographic Processes)
IT 129-79-3 574-93-6 1306-23-6, uses and miscellaneous
1314-13-2, uses and miscellaneous 24938-04-3 25067-59-8
29563-07-3
(electrophotographic photoconductive toner contg.)

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L64 ANSWER 1 OF 31 HCA COPYRIGHT 2003 ACS
136:238741 Interparticle electron transfer between size-quantized CdS

and TiO₂ **semiconductor** nanoclusters. Sant, Paul A.; Kamat, Prashant V. (Notre Dame Radiation Laboratory, Notre Dame, IN, 46556-0579, USA). Physical Chemistry Chemical Physics, 4(2), 198-203 (English) 2002. CODEN: PPCPFQ. ISSN: 1463-9076. Publisher: Royal Society of Chemistry.

AB Photoinduced electron transfer in a size-quantized CdS/TiO₂ composite system was studied using emission and transient absorption spectroscopy. **Quantum**-sized CdS and TiO₂ particles were synthesized in reverse micelles using di-octyl sulfosuccinate (**Aerosol**-OT, AOT) as the surfactant stabilizer. The particle sizes of CdS and TiO₂ were controlled by varying H₂O-to-surfactant molar ratio, $w_o = [H_2O]/[AOT]$, with values of 1, 2.5, 5 and 10. The blue-shift in the absorption onset confirmed size-quantization of these **semiconductor** particles. Electron transfer from photoexcited CdS to TiO₂ depends on the particle size of TiO₂, where charge transfer was obsd. only when TiO₂ particles were sufficiently large (>12 .ANG.). Interactions with smaller size TiO₂ particles (.ltoreq.10 .ANG.) with CdS instead led to enhancements in emission with an increase in **quantum** yield from 2.3% to 8.8%. Picosecond laser flash photolysis expts. were carried out to elucidate the interparticle electron transfer processes in the CdS/TiO₂ reverse micellar system.

IT 1306-23-6, Cadmium sulfide (CdS), uses
(interparticle electron transfer between size-quantized CdS and TiO₂ **semiconductor** nanoclusters)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST cadmium sulfide titanium oxide **semiconductor** nanocluster

IT Absorption spectroscopy

Clusters

Electron transfer

Flash photolysis

Nanostructures

Photoinduced electron transfer

Surfactants

(interparticle electron transfer between size-quantized CdS and TiO₂ **semiconductor** nanoclusters)

IT 1306-23-6, Cadmium sulfide (CdS), uses 7732-18-5, Water, uses 13463-67-7, Titanium oxide (TiO₂), uses

(interparticle electron transfer between size-quantized CdS and TiO₂ **semiconductor** nanoclusters)

L64 ANSWER 2 OF 31 HCA COPYRIGHT 2003 ACS

136:158862 Methods for the lithographic deposition of materials containing **nanoparticles**. Hill, Ross H.; Bravo-Vasquez, Juan Pablo (Can.). U.S. Pat. Appl. Publ. US 20020018861 A1

20020214, 5 pp. (English). CODEN: USXXCO. APPLICATION: US
2001-918908 20010730. PRIORITY: US 2000-PV221844 20000728.

AB A method for depositing **nanoparticles** in a thin film
through the dispersion of such **nanoparticles** in a
precursor soln. which is deposited on a substrate and converted into
a metal or metal oxide film. The resulting metal or metal oxide
film will contain embedded **nanoparticles**. Such films can
be used in a variety of applications such as diffusion barriers,
electrodes for capacitors, conductors, resistors, inductors,
dielects., or magnetic materials. The **nanoparticle**
material may be selected by one skilled in the art based on the
particular application.

IT 1306-23-6P, Cadmium sulfide (CdS), preparation
(methods for the lithog. deposition of materials contg.
nanoparticles)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

IC ICM B05D005-12

NCL 427532000

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)
Section cross-reference(s): 76

ST lithog deposition **nanoparticle** metal oxide film

IT Coating process
(dip; methods for the lithog. deposition of materials contg.
nanoparticles)

IT **Nanoparticles**
Spraying
(methods for the lithog. deposition of materials contg.
nanoparticles)

IT Electric circuits
(microcircuits; methods for the lithog. deposition of materials
contg. **nanoparticles** in relation to)

IT Vapor deposition process
(photochem.; methods for the lithog. deposition of materials
contg. **nanoparticles** in relation to)

IT Coating process
(spin; methods for the lithog. deposition of materials contg.
nanoparticles)

IT 11129-60-5, Manganese oxide
(methods for the lithog. deposition of materials contg.
nanoparticles)

IT 15956-58-8P, Manganese 2-ethylhexanoate
(methods for the lithog. deposition of materials contg.
nanoparticles)

IT 1306-23-6P, Cadmium sulfide (CdS), preparation
(methods for the lithog. deposition of materials contg.
nanoparticles)

IT 62-56-6, Thiourea, reactions 543-90-8, Cadmium acetate 577-11-7, Sodium bis(2-ethylhexyl)sulfosuccinate 1313-82-2, Sodium sulfide, reactions 13760-37-7, Cadmium perchlorate
(methods for the lithog. deposition of materials contg.

nanoparticles)

IT 107-21-1, Ethylene glycol, uses 7664-41-7, Ammonia, uses 12125-02-9, Ammonium chloride, uses
(methods for the lithog. deposition of materials contg.

nanoparticles)

L64 ANSWER 3 OF 31 HCA COPYRIGHT 2003 ACS

134:226224 Large-scale production of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**. Nichols, W.

T.; Keto, J. W.; Henneke, D. E.; Brock, J. R.; Malyavanatham, G.; Becker, M. F.; Glicksman, H. D. (Department of Physics and Texas Materials Institute, The University of Texas at Austin, Austin, TX, 78712, USA). Applied Physics Letters, 78(8), 1128-1130 (English) 2001. CODEN: APPLAB. ISSN: 0003-6951. Publisher: American Institute of Physics.

AB The prodn. of **nanoparticles** by laser ablation of **microparticles**, entrained at high d. in a flowing **aerosol**, is exptl. demonstrated. The currently measured prodn. rate of 20 g per h could be scaled to industrially useful rates. The size distribution of particles was characterized and nearly monodisperse distributions were found, where mean sizes were smaller and varied less with laser fluence than was obsd. for ablation of **microparticles** held on flat plates. Mean size was controlled from 4-20 nm by varying the type and pressure of carrier gas. Ag and CdSe **nanoparticles** were cryst. having few dislocations. Materials tested included metals (Ag, Au, and W), **semiconductors** (Si, CdSe, GaN, and ZnO), ceramics (WC, SiC, and YBa2Cu3O7), and a ferroelec. Two types of collection processes are described that preserve the nonagglomerated nature of the particles, even at high mass densities.

IT 1306-24-7P, Cadmium selenide (CdSe), preparation
(nanocrystals; large-scale prodn. of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**)

RN 1306-24-7 HCA

CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

CC 57-9 (Ceramics)

Section cross-reference(s): 56, 76

ST nanocrystal prodn laser ablation **microparticle** flowing **aerosol**

IT Ferroelectric materials

(ceramic, nanocrystals; large-scale prodn. of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**)

- IT **Aerosols**
Laser ablation
Microparticles
Nanocrystals
(large-scale prodn. of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**)
- IT Vapor deposition process
(laser ablation; large-scale prodn. of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**)
- IT 409-21-2P, Silicon carbide (SiC), preparation **1306-24-7P**, Cadmium selenide (CdSe), preparation 1314-13-2P, Zinc oxide (ZnO), preparation 7440-21-3P, Silicon, preparation 7440-22-4P, Silver, preparation 7440-33-7P, Tungsten, preparation 7440-57-5P, Gold, preparation 12070-12-1P, Tungsten carbide (WC) 25617-97-4P, Gallium nitride (GaN) 109064-29-1P, Barium copper yttrium oxide (Ba₂Cu₃YO₇)
(nanocrystals; large-scale prodn. of nanocrystals by laser ablation of **microparticles** in a flowing **aerosol**)
- L64 ANSWER 4 OF 31 HCA COPYRIGHT 2003 ACS
133:272243 Solution synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films. Schulz, Douglas L.; Curtis, Calvin J.; Ginley, David S. (Midwest Research Institute, USA). U.S. US 6126740 A 20001003, 13 pp., Cont.-in-part of U.S. 5,711,803. (English). CODEN: USXXAM. APPLICATION: US 1998-14326 19980127. PRIORITY: US 1995-536348 19950929.
- AB A colloidal suspension comprising metal chalcogenide **nanoparticles** and a volatile capping agent. The colloidal suspension is made by reacting a metal salt with a chalcogenide salt in an org. solvent to ppt. a metal chalcogenide, recovering the metal chalcogenide, and admixing the metal chalcogenide with a volatile capping agent. The colloidal suspension is **spray** deposited onto a substrate to produce a **semiconductor** precursor film which is substantially free of impurities.
- IT **1306-23-6P**, Cadmium sulfide, properties
(CdS **nanoparticle** colloids prepd. by reacting a CdI₂ in methanol with Na₂S in methanol)
- RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- IC ICM C30B001-02
NCL 117004000
CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): **76**
ST colloid **nanoparticle** metal chalcogenide **spray** deposition

- IT Chalcogenides
(metal; soln. synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films)
- IT Colloids
Nanoparticles
(soln. synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films)
- IT **Semiconductor** materials
(soln. synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films for use as)
- IT Coating process
(**spray**; soln. synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films)
- IT 1306-23-6P, Cadmium sulfide, properties
(CdS **nanoparticle** colloids prepd. by reacting a CdI₂ in methanol with Na₂S in methanol)
- IT 1313-82-2, Sodium sulfide, reactions 7790-80-9, Cadmium iodide, CdI₂
(CdS **nanoparticle** colloids prepd. by reacting a CdI₂ in methanol with Na₂S in methanol)
- IT 67-56-1, Methanol, uses 110-86-1, Pyridine, uses
(Cu-In-Ga-Se **nanoparticle** colloids prepd. by reacting a mixt. of CuI, InI₃ and GaI₃ in pyridine with Na₂Se in methanol)
- IT 296797-58-5P, Copper gallium indium selenide
(Cu_{1.1}Ga_{0.23}In_{0.68}Se_{1.19})
(Cu-In-Ga-Se **nanoparticle** colloids prepd. by reacting a mixt. of CuI, InI₃ and GaI₃ in pyridine with Na₂Se in methanol)
- IT 1313-85-5, Sodium selenide 7681-65-4, Copper iodide, CuI
13450-91-4, Gallium iodide 13510-35-5, Indium iodide
(Cu-In-Ga-Se **nanoparticle** colloids prepd. by reacting a mixt. of CuI, InI₃ and GaI₃ in pyridine with Na₂Se in methanol)

L64 ANSWER 5 OF 31 HCA COPYRIGHT 2003 ACS

133:267729 Reverse Micellar Synthesis of a **Nanoparticle**
/Polymer Composite. Pavel, Florentina M.; Mackay, Raymond A.
(Department of Chemistry and Center for Advanced Materials
Processing, Clarkson University, Potsdam, NY, 13699-5665, USA).
Langmuir, 16(23), 8568-8574 (English) 2000. CODEN: LANGD5. ISSN:
0743-7463. Publisher: American Chemical Society.

AB Cadmium sulfide **nanoparticle**/polymer composites have been
produced using a one-system reverse micellar synthesis. A monomer,
Me methacrylate (MMA), was used as the oil and polymd. following
formation of 2-3 nm CdS **particles** in the fluid
medium. When **Aerosol** OT (AOT) was employed as the
surfactant, opaque solids contg. 20-80 nm aggregates of the CdS
nanoparticles were obtained. The aggregates were fairly
uniform in size, their diam. depending on the AOT concn. With a 1:1
wt. ratio of MMA and a polyethylene glycol diacrylate, aggregation

was eliminated but the solid remained opaque. Replacing the AOT by the polymerizable surfactant didecyldimethylammonium methacrylate with MMA as the oil led to the formation of a transparent solid matrix contg. nonaggregated CdS particles.

IT 1306-23-6, Cadmium sulfide, uses
(**nanoparticles**; reverse micellar synthesis of a
nanoparticle/polymer composite)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 38-3 (Plastics Fabrication and Uses)

ST cadmium sulfide **nanoparticle** nanocomposite methacrylate
homopolymer copolymer prepn; polyethylene glycol diacrylate
copolymer cadmium sulfide **nanoparticle** nanocomposite
prepn; didecyldimethylammonium methacrylate copolymer cadmium
sulfide **nanoparticle** nanocomposite; reverse micellar
synthesis cadmium sulfide **nanoparticle** nanocomposite

IT Electric conductivity
(reverse micellar synthesis and elec. cond. of a
nanoparticle/polymer composite)

IT **Nanoparticles**
Surfactants
(reverse micellar synthesis of a **nanoparticle**/polymer
composite)

IT Micelles
(reverse; reverse micellar synthesis of a **nanoparticle**
/polymer composite)

IT 1306-23-6, Cadmium sulfide, uses
(**nanoparticles**; reverse micellar synthesis of a
nanoparticle/polymer composite)

IT 9011-14-7P, PMMA 100942-80-1P, Polyethylene glycol
diacrylate-methyl methacrylate copolymer 288154-46-1P,
Didecyldimethylammonium methacrylate-methyl methacrylate copolymer,
properties
(reverse micellar synthesis of a **nanoparticle**/polymer
composite)

IT 577-11-7, **Aerosol** OT 166664-94-4, uses
(surfactant; reverse micellar synthesis of a **nanoparticle**
/polymer composite)

L64 ANSWER 6 OF 31 HCA COPYRIGHT 2003 ACS

133:20043 Solar cell contacts using **nano-sized**
dispersions. Schulz, Doug; Ribelin, R.; Wu, X.; Jones, K. M.;
Matson, R. J.; Curtis, C. J.; Gessert, T.; Ginley, D. S. (National
Renewable Energy Laboratory, Golden, CO, 80401-3393, USA).
Materials Research Society Symposium Proceedings, 581(Nanophase and
Nanocomposite Materials III), 157-162 (English) 2000. CODEN:
MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.

AB **Nano-sized** dispersions have been employed as

precursor inks for the **spray** deposition of contacts to both Si and CdTe materials. In the case of Si, **nano-sized Al particles (nano-Al)** were dispersed and **spray** deposited onto p-type Si. Annealing above the eutectic temp. causes alloy formation yielding a p+ layer with $\rho \approx 10^{-4} \Omega \cdot \text{cm}$. For CdTe, **nano-sized Te particles (nano-Te)** were dispersed and **sprayed** onto CdTe/CdS/SnO₂/glass heterostructures. Contact to the CdTe layer occurred during a 30 min anneal in He at 215 to 255.degree.C. These solar cells were finished by spin-coating the Te layer with Ag paint and subsequently annealing in air (100 K/h). This approach produces solar cells with open circuit voltages (Voc) from 720 to 800 mV, short circuit current densities (Jsc) from 18 to 20 mA/cm² and efficiencies up to 10.3%. The performance of these cells was similar to those produced using the std. NREL contact.

IT 1306-25-8, Cadmium telluride, uses
 (solar cell contacts using **nano-sized**
 dispersions)
 RN 1306-25-8 HCA
 CN Cadmium telluride (CdTe) (9CI) (CA INDEX NAME)

Cd=Te

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 76
 ST solar cell contact aluminum **spray** deposition; silicon
 cadmium telluride solar cell contact
 IT Solar cells
 (silicon and cadmium telluride; solar cell contacts using
nano-sized dispersions)
 IT Coating process
 (**spray**; solar cell contacts using **nano-**
sized dispersions)
 IT 7429-90-5, Aluminum, uses 13494-80-9, Tellurium, uses
 (contact; solar cell contacts using **nano-sized**
 dispersions)
 IT 1306-25-8, Cadmium telluride, uses 7440-21-3, Silicon,
 uses
 (solar cell contacts using **nano-sized**
 dispersions)

L64 ANSWER 7 OF 31 HCA COPYRIGHT 2003 ACS
 132:115709 Preparation of ZnS **nanoparticles** by electrospray
 pyrolysis. Lenggoro, I. Wuled; Okuyama, Kikuo; De la Mora, Juan
 Fernandez; Tohge, Noboru (Department of Chemical Engineering,
 Hiroshima University, Higashi-Hiroshima, 739-8527, Japan). Journal
 of Aerosol Science, Volume Date 2000, 31(1), 121-136 (English) 1999.
 CODEN: JALSB7. ISSN: 0021-8502. Publisher: Elsevier Science Ltd..
 AB Zn sulfide **particles** 20-40 nm in diam. were
 prepd. by elec. driven **spray** pyrolysis. Solns. of Et alc.

with Zn nitrate ($\text{Zn}(\text{NO}_3)_2$) and thiourea ($\text{SC}(\text{NH}_2)_2$) at concns. from 0.0025 to 0.2 mol L⁻¹ and elec. conductivities between 10⁻⁴ and 10⁻¹ S m⁻¹ were electrosprayed from steady cone-jets at flow rates from 0.05 to 0.16 mL h⁻¹, with pos. and neg. polarity. The initially highly charged drops formed were neutralized by bipolar ions from a radioactive source to increase the overall transmission efficiency through a reactor furnace. This process was made particularly effective by the innovation of placing the ion source directly within the electrospray chamber. The diams. of the final ZnS particles were measured online by a differential mobility analyzer and a condensation nucleus counter. In spite of ambiguities in the flow rate of liq. through the cone-jet (assocd. to solvent evapn. from the meniscus), these diams. agree approx. with values expected from available scaling laws. Transmission electron micrographs also confirmed these results. Electrospray pyrolysis is hence able to generate non-agglomerated and spherical ZnS **nanoparticles** with geometrical std. deviation .sigma.g of .apprx.1.3.

IT 1314-98-3P, Zinc sulfide (ZnS), properties
 (prepn. of zinc sulfide **nanoparticles** by electrospray
 pyrolysis)
 RN 1314-98-3 HCA
 CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 76-2 (Electric Phenomena)
 Section cross-reference(s): 42, 66
 ST electrospray pyrolysis zinc sulfide **nanoparticle**
 IT **Spraying**
 (electrospraying; prepn. of zinc sulfide **nanoparticles**
 by electrospray pyrolysis)
 IT Particle size
 Particle size distribution
 (of zinc sulfide **nanoparticles** prepd. by electrospray
 pyrolysis)
 IT Ion sources
 Jets
Nanoparticles
 (prepn. of zinc sulfide **nanoparticles** by electrospray
 pyrolysis)
 IT Calcination
 (**spray**; prepn. of zinc sulfide **nanoparticles**
 by electrospray pyrolysis)
 IT 64-17-5, Ethanol, processes
 (in prepn. of zinc sulfide **nanoparticles** by
 electrospray pyrolysis)
 IT 1314-98-3P, Zinc sulfide (ZnS), properties
 (prepn. of zinc sulfide **nanoparticles** by electrospray
 pyrolysis)
 IT 62-56-6, Thiourea, reactions 7779-88-6, Zinc nitrate
 (prepn. of zinc sulfide **nanoparticles** by electrospray

pyrolysis)

L64 ANSWER 8 OF 31 HCA COPYRIGHT 2003 ACS

131:121319 Solution synthesis of mixed-metal chalcogenide

nanoparticles and **spray** deposition of precursor

films. Schulz, Douglas L.; Curtis, Calvin J.; Ginley, David S.

(Midwest Research Institute, USA). PCT Int. Appl. WO 9937832 A1

19990729; 34 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB,

BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM,

HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,

LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,

SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ,

MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK,

ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN,

TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US1434

19990122. PRIORITY: US 1998-14326 19980127.

AB A colloidal suspension comprising metal chalcogenide

nanoparticles and a volatile capping agent. The colloidal

suspension is made by reacting a metal salt with a chalcogenide salt

in an org. solvent to ppt. a metal chalcogenide, recovering the

metal chalcogenide, and admixing the metal chalcogenide with a

volatile capping agent. The colloidal suspension is **spray**

deposited onto a substrate to produce a **semiconductor**

precursor film which is substantially free of impurities.

IT 1306-23-6P, Cadmium sulfide, properties

(prepn. of CdS colloidal **nanoparticles** for

spray coating **semiconductor** films by reaction

of CdI₂ and Na₂S in methanol)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

IT 1306-25-8P, Cadmium telluride, properties

(prepn. of CdTe colloidal **nanoparticles** for

spray coating **semiconductor** films by reaction

of CdI₂ and Na₂Te in methanol)

RN 1306-25-8 HCA

CN Cadmium telluride (CdTe) (9CI) (CA INDEX NAME)

Cd=Te

IC ICM C30B001-00

ICS C30B001-02; C30B029-46; C30B029-48; C30B029-50

CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 52, 75, 76

ST metal chalcogenide colloid **semiconductor**

nanoparticle spray coating film

IT Chalcogenides

(metal; soln. synthesis of mixed-metal chalcogenide

- nanoparticles** and **spray** deposition of precursor films)
- IT Colloids
(prepn. of CdS and CdTe colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂S in methanol)
- IT **Nanoparticles**
Semiconductor films
(prepn. of **semiconductor nanoparticle** films by reaction of CuI, InI₃, GaI₃ in pyridine and Na₂Se in methanol)
- IT Coating process
(**spray**; soln. synthesis of mixed-metal chalcogenide **nanoparticles** and **spray** deposition of precursor films)
- IT 7681-82-5, Sodium iodide, processes
(formation of methanol sol. NaI byproducts from Cu-In-Ga-Se colloidal **nanoparticle** synthesis)
- IT 7790-80-9, Cadmium iodide
(prepn. of CdS and CdTe colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂S in methanol)
- IT 1306-23-6P, Cadmium sulfide, properties
(prepn. of CdS colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂S in methanol)
- IT 1313-82-2, Sodium sulfide (Na₂S), reactions
(prepn. of CdS colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂S in methanol)
- IT 12034-41-2, Sodium telluride, Na₂Te
(prepn. of CdTe colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂S in methanol)
- IT 1306-25-8P, Cadmium telluride, properties
(prepn. of CdTe colloidal **nanoparticles** for **spray** coating **semiconductor** films by reaction of CdI₂ and Na₂Te in methanol)
- IT 208648-32-2, Copper gallium indium selenide (Cu_{1.1}Ga_{0.23}In_{0.68}Se_{1.91})
(prepn. of **semiconductor nanoparticle** films by reaction of CuI, InI₃, GaI₃ in pyridine and Na₂Se in methanol)
- IT 67-56-1, Methanol, uses 110-86-1, Pyridine, uses
(prepn. of **semiconductor nanoparticle** films by reaction of CuI, InI₃, GaI₃ in pyridine and Na₂Se in methanol)
- IT 144972-86-1P, Copper gallium indium selenide
(prepn. of **semiconductor nanoparticle** films by reaction of CuI, InI₃, GaI₃ in pyridine and Na₂Se in methanol)
- IT 1313-85-5, Sodium selenide, Na₂Se 7681-65-4, Copper iodide, CuI
13450-91-4, Gallium iodide, GaI₃ 13510-35-5, Indium iodide, InI₃
(prepn. of **semiconductor nanoparticle** films by reaction of CuI, InI₃, GaI₃ in pyridine and Na₂Se in methanol)
- IT 75-05-8, Acetonitrile, uses

(soln. synthesis of mixed-metal chalcogenide
nanoparticles and **spray** deposition of precursor
films)

L64 ANSWER 9 OF 31 HCA COPYRIGHT 2003 ACS

129:83712 Microcrystalline thin metal oxide films for optoelectronic applications. Malik, Alexander; Seco, Ana; Fortunato, Elvira; Martins, Rodrigo (CEMOP-UNINOVA, Quinta da Torre, Monte de Caparica, Port.). Journal of Non-Crystalline Solids, 227-230 (Pt. B), 1092-1095 (English) 1998. CODEN: JNCSBJ. ISSN: 0022-3093. Publisher: Elsevier Science B.V..

AB We report the properties and optoelectronic applications of transparent and conductive indium and tin oxide films prepd. by the **spray** pyrolysis method and doped with Sn or F, resp. The film properties have been measured using X-ray diffraction, optical and elec. absorption. As examples of applications we produced a set of selective optical detectors for different spectral regions, covering the wavelength range from 0.25 to 1.1 μm , based on metal oxide-**semiconductor** heterostructures and using different substrates such as: GaP, GaSe, $\text{Al}_x\text{Ga}_{1-x}\text{As}$, GaAs and Si. The fabricated devices exhibit several features such as: prodn. simplicity, high **quantum** efficiency, uniform sensitivity over the entire active area and a high response speed. Finally, we present a high **quantum** efficiency and solar blind monocryst. zinc sulfide optical sensor fabricated by **spray** deposition as an alternative to the UV-enhanced SiC and GaN photodetectors and the performances of a solar cell.

IT 1314-98-3, Zinc sulfide, uses
(substrate; microcryst. thin metal oxide films for optoelectronic applications)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 73

IT 1314-98-3, Zinc sulfide, uses 7440-21-3, Silicon, uses
12024-11-2, Gallium selenide 12063-98-8, Gallium phosphide gap,
uses 37382-15-3, Aluminum gallium arsenide ((Al,Ga)As)
(substrate; microcryst. thin metal oxide films for optoelectronic applications)

L64 ANSWER 10 OF 31 HCA COPYRIGHT 2003 ACS

129:47174 New UV-enhanced solar blind optical sensors based on monocrystalline zinc sulfide. Malik, Alexander; Seco, Ana; Fortunato, Elvira; Martins, Rodrigo (CEMOP-UNINOVA, Dep. Cienc. Mater., FCT-UNL, Quinta Torre, Monte de Caparica, P-2825, Port.). Sensors and Actuators, A: Physical, A67(1-3), 68-71 (English) 1998. CODEN: SAAPEB. ISSN: 0924-4247. Publisher: Elsevier Science S.A..

AB UV-enhanced monocryst. Zn sulfide optical sensors with high

quantum efficiency were developed by **spray** deposition of heavy F-doped Sn oxide (FTO) thin films onto the surface of Zn sulfide monocrystals as an alternative to the UV-enhanced high-efficiency Si photodetectors commonly used in precise radiometric and spectroscopic measurements as well as to new sensors based on SiC and GaN. The fabricated sensors have an unbiased internal **quantum** efficiency that is nearly 100% from 250 to 320 nm, and the typical sensitivity at 250 nm is 0.15 A W⁻¹. The sensors are insensitive to solar radiation in conditions on the earth and can be used as solar blind photodetectors for precision UV measurements under direct solar illumination for both terrestrial and space applications.

IT 1314-98-3, Zinc sulfide, properties
(new UV-enhanced solar blind optical sensors based on monocryst.
zinc sulfide with fluorine doping)
RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 76

IT 1314-98-3, Zinc sulfide, properties 1332-29-2, Tin oxide
50926-11-9, ITO
(new UV-enhanced solar blind optical sensors based on monocryst.
zinc sulfide with fluorine doping)

L64 ANSWER 11 OF 31 HCA COPYRIGHT 2003 ACS

128:198485 UV enhanced and solar blind photodetectors based on large-band-gap materials. Malik, A.; Martins, R. (CEMOP/UNINOVA, Monte de Caparica, P-2825, Port.). Materials Science Forum, 258-263 (Pt. 3, Defects in Semiconductors, Pt. 3), 1425-1430 (English) 1997. CODEN: MSFOEP. ISSN: 0255-5476. Publisher: Trans Tech Publications Ltd..

AB A new type of an UV-enhanced optical sensor with a high UV **quantum** efficiency, linearity within a broad range of light intensity, and insensitivity to direct solar radiation in terrestrial conditions was fabricated and tested. Heavy F-doped SnO₂ thin films with carrier concns. near 10²¹ cm⁻³ were grown on ZnS monocryst. substrates by **spray** deposition at 430.degree. from an alc. soln. of NH₄F and SnCl₄.5H₂O. The films were characterized by XRD, thickness measurements, elec. resistivity and Hall effect measurements, reflectance spectra, and measurements of the optical specular transmittance. The sensors fabricated from these films had an unbiased internal **quantum** efficiency of nearly 100% from 250-320 nm and the typical sensitivity at 290 nm was 0.15 A/W. The sensors were insensitive to solar radiation under terrestrial conditions and could be used as solar blind detectors for precision UV measurements under direct solar illumination.

IT 1314-98-3, Zinc sulfide, uses

(UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

RN 1314-98-3 HCA

CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S==Zn

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 75, 76

ST zinc sulfide tin oxide UV photodetector; **spray** pyrolysis
tin oxide fluorine photodetector; optical elec property tin oxide photodetector

IT Optical detectors

(UV; UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

IT Crystallinity

IR spectra

Photocurrent

UV and visible spectra

(of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis for UV-enhanced and solar blind photodetectors)

IT Band gap

(optical; of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis for UV-enhanced and solar blind photodetectors)

IT Calcination

(**spray**; UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

IT 1314-98-3, Zinc sulfide, uses

(UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

IT 18282-10-5, Tin dioxide

(UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

IT 7782-41-4, Fluorine, uses

(dopant; UV-enhanced and solar blind photodetectors of F-doped SnO₂ deposited on ZnSe by **spray** pyrolysis)

L64 ANSWER 12 OF 31 HCA COPYRIGHT 2003 ACS

128:185049 Fabrication and Characterization of CdS-**Nanoparticle**

Mono- and Multilayers on a Self-Assembled Monolayer of

Alkanedithiols on Gold. Nakanishi, Takuya; Ohtani, Bunsho; Uosaki, Kohei (Physical Chemistry Laboratory Division of Chemistry, Graduate School of Science Hokkaido University, Sapporo, 060, Japan).

Journal of Physical Chemistry B, 102(9), 1571-1577 (English) 1998.

CODEN: JPCBFK. ISSN: 1089-5647. Publisher: American Chemical Society.

AB Mono- and multilayers of cadmium sulfide (CdS) **nanoparticles** were fabricated on a gold substrate covered with alkanedithiol self-assembled monolayers (SAMs) by an alternate immersion of the substrate into ethanolic solns. of dithiol, 1,6-hexanedithiol, or

1,10-decanedithiol and a dispersion of CdS **nanoparticles** (ca. 3 nm in diam.), the latter of which was prepd. in sodium bis(2-ethylhexyl)sulfosuccinate (**Aerosol OT**, AOT)/H₂O/heptane reversed micelles. A layer-by-layer structure of dithiol SAM and CdS monolayer was confirmed with Fourier transform IR reflection-absorption spectroscopy (FT-IRRAS) and XPS at each step of composite-film prepn. It was revealed that CdS **nanoparticles** on SAMs were surrounded by AOT, which was then substituted by dithiols when the film was treated with the dithiol soln. The amt. of CdS **nanoparticles** on the sample was measured by inductively coupled plasma mass spectrometry (ICP-MS) to be consistent with the above-mentioned monolayer structure. The photoinduced anodic current was obsd. when the composite film was immersed in an electrolyte soln. contg. triethanolamine as an electron donor. An action spectrum, which was quite similar to the absorption spectrum of CdS dispersion, indicates that the CdS **nanoparticle** keeps its size without mutual aggregation, and **semiconducting** properties even after being immobilized on the substrate.

IT 1306-23-6P, Cadmium sulfide, properties
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 52, 73, 74, 76

ST cadmium sulfide **nanoparticle** alkanedithiol monolayer gold;
decanedithiol hexanedithiol SAM gold cadmium sulfide

IT Adsorbed monolayers

Nanoparticles

Self-assembly

(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

IT Thiols (organic), properties

(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

IT Films

(multilayer; fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

IT Micelles

(reverse; fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

IT 1191-43-1, 1,6-Hexanedithiol 1191-67-9, 1,10-Decanedithiol

- (fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)
- IT 102-71-6, Triethanolamine, properties
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)
- IT 7440-57-5, Gold, properties
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)
- IT 1306-23-6P, Cadmium sulfide, properties
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)
- IT 577-11-7, AOT
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers prep'd. from AOT reverse micelles on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)
- IT 142-82-5, Heptane, properties
(fabrication and characterization of CdS-**nanoparticle** mono- and multilayers prep'd. from AOT reverse micelles on SAMs of 1,6-hexanedithiol and 1,10-decanedithiol on gold)

L64 ANSWER 13 OF 31 HCA COPYRIGHT 2003 ACS

- 127:241380 Construction of **semiconductor nanoparticle** layers on gold by self-assembly technique. Nakanishi, Takuya; Ohtani, Bunsho; Uosaki, Kohei (Physical Chemistry Laboratory, Division of Chemistry, Graduate School of Science, Hokkaido University, Sapporo, 060, Japan). Japanese Journal of Applied Physics, Part 1: Regular Papers, Short Notes & Review Papers, 36(6B), 4053-4056 (English) 1997. CODEN: JAPNDE. ISSN: 0021-4922. Publisher: Japanese Journal of Applied Physics.
- AB Cadmium sulfide (CdS) **nanoparticles** were prep'd. using the **Aerosol-OT** (AOT)/heptane inverse-micelle method. The particle size was controlled by changing the [H₂O]/[AOT] ratio in the prepn. process to be ca. 3 nm, which was estd. from their absorption max. (ca. 385 nm) and absorption edge (ca. 450 nm) in heptane solns. Self-assembled monolayers (SAMs) of .alpha.,.omega.-dithiols were prep'd. on (111)-oriented gold substrates. They were highly stable in aq. solns. and showed a blocking effect toward electron exchange between the gold substrate and the electroactive species in the soln. Mono- and multi-layers of CdS **nanoparticles** were prep'd. by immersing the SAM-covered gold substrates in a heptane soln. contg. CdS particles. IR reflection-absorption spectra revealed that CdS particles on SAMs were surrounded by AOT and that a sequential immersion procedure led to the alternately layered structure of CdS particles and dithiol mols.
- IT 1306-23-6P, Cadmium sulfide, properties
(**nanoparticles**; construction of **semiconductor nanoparticle** layers on gold by self-assembly technique)

RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 76-2 (Electric Phenomena)
 ST **semiconductor** cadmium sulfide **nanoparticle** layer
 gold; dithiol modified gold surface **semiconductor** layer
 IT **Nanoparticles**
 Semiconductor materials
 (CdS; construction of **semiconductor**
 nanoparticle layers on gold by self-assembly technique)
 IT Multilayers
 Particle size
 (construction of **semiconductor nanoparticle**
 layers on dithiol-modified gold surface by self-assembly
 technique)
 IT 1191-43-1, 1,6-Hexanedithiol 1191-67-9, 1,10-Decanedithiol
 (construction of **semiconductor nanoparticle**
 layers on dithiol-modified gold surface by self-assembly
 technique)
 IT 7440-57-5, Gold, processes
 (construction of **semiconductor nanoparticle**
 layers on dithiol-modified gold surface by self-assembly
 technique)
 IT 142-82-5, Heptane, uses 577-11-7, **Aerosol-OT**
 (in construction of **semiconductor nanoparticle**
 layers on dithiol-modified gold surface by self-assembly
 technique)
 IT 1306-23-6P, Cadmium sulfide, properties
 (**nanoparticles**; construction of **semiconductor**
 nanoparticle layers on gold by self-assembly technique)

L64 ANSWER 14 OF 31 HCA COPYRIGHT 2003 ACS

125:231483 Synthesized "in situ" in reverse micelles of silver-sulfide
semiconductors. Pileni, M. P.; Motte, L.; Billoudet, F.;
 Petit, C. (Laboratoire SRSI, Univ. P. et M. Curie, Paris, 75005,
 Fr.). Surface Review and Letters, 3(1), 1215-1218 (English) 1996.
 CODEN: SRLEFH. ISSN: 0218-625X. Publisher: World Scientific.

AB Functionalized reverse micelles were used to control the size of
 Ag₂S **nanosize** particles. The **size** (2-10
nm) of the crystallites varies linearly with the H₂O
 content. The particles were coated with dodecanethiol and extd.
 from the micelles. The size of the particles dispersed in heptane
 was detd. by small-angles x-ray scattering (SAXS) expts. and
 compared to those obtained by TEM. Good agreement is obsd. between
 results obtained by these 2 techniques. A drop of particles
 previously dispersed in heptane was dried on a carbon mesh. A
 network of particles forming monolayers of crystallites in a
 hexagonal distribution appears.

IT 21548-73-2P, Silver sulfide

(silver sulfide colloid **semiconductor** particle reverse micelle synthesis with size control)

RN 21548-73-2 HCA

CN Silver sulfide (Ag₂S) (8CI, 9CI) (CA INDEX NAME)

Ag-S-Ag

CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 76, 78

ST silver sulfide colloid **semiconductor** reverse micelle

IT **Semiconductor** materials

(colloidal, colloid **semiconductor** particle reverse micelle synthesis with size control)

IT Micelles

(reverse, silver sulfide colloid **semiconductor** particle reverse micelle synthesis with size control)

IT 112-55-0, 1-Dodecanethiol 142-82-5, Heptane, uses 540-84-1, Isooctane 577-11-7, **Aerosol** OT

(silver sulfide colloid **semiconductor** particle reverse micelle synthesis with size control)

IT 21548-73-2P, Silver sulfide

(silver sulfide colloid **semiconductor** particle reverse micelle synthesis with size control)

L64 ANSWER 15 OF 31 HCA COPYRIGHT 2003 ACS

125:211002 Preparation of CdS and ZnS particles in nanophase reactors provided by binary liquids adsorbed at layered clay and spherical silica particle surfaces. Dekany, Imre; Fendler, Janos H. (Dep. Colloid Chem., Attila Jozsef Univ., Szeged Aradi, H-6720, Hung.). NATO ASI Series, Series 3: High Technology, 12(Fine Particles Science and Technology), 443-455 (English) 1996. CODEN: NAHTF4. Publisher: Kluwer.

AB The polar component of binary (liq. alc.-cyclohexane) liqs. was shown to adsorb selectively at the surfaces of clay mineral (montmorillonite) and silica (**aerosol**) particle surfaces and, thus, to provide a unique nanophase reactor. Detn. of the adsorption excess isotherms from alc.-cyclohexane liq. mixts. on this solid particles provided information on the compn. and the vols. of the adsorption layer as nanophase reactor. CdS and ZnS particles were generated in the nanophase reactor by introducing the reactants into the surface of clay in the interlamellar space and the adsorption layer of silica particles. The **nanoparticles** in the nanophase reactor were elucidated by absorption spectrophotometry to det. the absorption threshold and the band gap energy. Small-angle x-ray scattering were performed to det. the particle size of **semiconductors** (d = 3.5-10 nm). Growing **semiconductor nanoparticles** on the silica or on clay mineral sheets showed a very sensitive increase of the rheol. parameters in **semiconductor-silica** org. suspensions. The heat of wetting was also measured to detect the surface modification of silica by CdS and ZnS **nanoparticles** in methanol.

IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
, Zinc sulfide, preparation
(prepn. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

CC 78-5 (Inorganic Chemicals and Reactions)
Section cross-reference(s): 66, 76
ST sulfide cadmium zinc **semiconductor nanoparticle**
prepn; nanophase reactor cadmium zinc sulfide prep; silica surface
cadmium zinc sulfide prep; montmorillonite nanophase reactor
sulfide **nanoparticle** prep
IT Adsorption
Particle size
(prepn. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)
IT Energy level, band structure
(gap, prep. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)
IT 64-17-5, Ethanol, processes 67-56-1, Methanol, processes
110-82-7, Cyclohexane, processes 1318-93-0D, Montmorillonite,
intercalation compd. with hexadecylpyridinium 7631-86-9, Silica,
processes
(for prep. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)
IT 543-90-8, Cadmium acetate 557-34-6, Zinc acetate 7783-06-4,
Hydrogen sulfide, reactions
(for prep. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)
IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
, Zinc sulfide, preparation
(prepn. of cadmium and zinc **semiconductor**
nanoparticles in nanophase reactor consisting of binary
alc.-cyclohexane adsorbed on silica or montmorillonite)

nanoparticles in reverse micelles. Qi, Limin; Ma, Jiming; Cheng, Humin; Zhao, Zhenguo (Department of Chemistry, Peking University, Beijing, 100871, Peop. Rep. China). Colloids and Surfaces, A: Physicochemical and Engineering Aspects, 111(3), 195-202 (English) 1996. CODEN: CPEAEH. ISSN: 0927-7757. Publisher: Elsevier.

- AB Three different types of mixed CdS-ZnS **semiconductor nanoparticles** were synthesized in reverse micelles and were characterized by optical absorption and photoluminescence (PL) spectroscopy. The copptd. $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ **nanoparticles** (comprised of homogeneously mixed crystals) show a continuously tunable energy gap from single CdS **nanoparticles** to ZnS **nanoparticles**. Coating the CdS core particles with a layer of ZnS in reverse micelles leads to ZnS-coated CdS (CdS/ZnS) **nanoparticles** with a core-shell structure, which show absorption and PL characteristics which differ considerably from those of either the copptd. particles or the sum of the sep. particles. The intensity of the PL band centered at 630 nm (which arises from the coated CdS/ZnS **nanoparticles**) shows a max. at a Zn/Cd molar ratio of .apprx. 1:1 on increasing the Zn/Cd ratio when the total concn. of CdS and ZnS is kept const. The CdS-coated ZnS (ZnS/CdS) **nanoparticles** synthesized in reverse micelles have absorption spectra similar to those of the coated CdS/ZnS **nanoparticles**, but show no significant luminescence activation.
- IT 1306-23-6P, Cadmium sulfide, properties 1314-98-3P, Zinc sulfide, properties 12442-27-2P, Cadmium zinc sulfide (CdS-ZnS **semiconductor nanoparticle** prepn. in Aerosol OT reverse micelles)
- RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

$\text{Cd}=\text{S}$

- RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

$\text{S}=\text{Zn}$

- RN 12442-27-2 HCA
CN Cadmium zinc sulfide ((Cd,Zn)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
S	1	7704-34-9
Zn	0 - 1	7440-66-6
Cd	0 - 1	7440-43-9

- CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 73, 76, 78
- ST IIB sulfide **semiconductor nanoparticle** reverse
micelle; cadmium zinc sulfide **nanoparticle** micelle prepn
- IT Luminescence
(CdS-ZnS **semiconductor nanoparticle** prepn. in
Aerosol OT reverse micelles)
- IT Energy level, band structure
(gap in; CdS-ZnS **semiconductor nanoparticle**
prepn. in **Aerosol** OT reverse micelles)
- IT Micelles
(reverse, CdS-ZnS **semiconductor nanoparticle**
prepn. in **Aerosol** OT reverse micelles)
- IT 577-11-7, **Aerosol** OT
(CdS-ZnS **semiconductor nanoparticle** prepn. in
Aerosol OT reverse micelles)
- IT 1306-23-6P, Cadmium sulfide, properties 1314-98-3P
, Zinc sulfide, properties 12442-27-2P, Cadmium zinc
sulfide
(CdS-ZnS **semiconductor nanoparticle** prepn. in
Aerosol OT reverse micelles)
- IT 543-90-8, Cadmium acetate 557-34-6, Zinc acetate 1313-82-2,
Sodium sulfide, reactions
(CdS-ZnS **semiconductor nanoparticle** prepn. in
Aerosol OT reverse micelles)
- L64 ANSWER 17 OF 31 HCA COPYRIGHT 2003 ACS
124:271397 Regulation and application of metal sulfide superfine
particles prepd. by reverse micelle method. Hirai, Takayuki;
Komasawa, Isao (Faculty of Basic Eng., Osaka Univ., Japan).
Kemikaru Enjiniyaringu, 41(2), 137-41 (Japanese) 1996. CODEN:
KEENAT. ISSN: 0387-1037. Publisher: Kagaku Kogyosha.
- AB A review with 11 refs. on reverse phase micelle prepn. of colloidal
semiconductor particles (CdS, ZnS) in reverse micelle
systems (**Aerosol** OT-isooctane). These particles are
characterized in terms of their diams. (**nanometer-**
scale) and spectra. 11 Refs.
- IT 1306-23-6P, Cadmium sulfide, properties 1314-98-3P
, Zinc sulfide, properties
(control of IIB sulfide colloidal **semiconductor**
particle prepn. in reverse micelle systems)
- RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

- CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 76
- ST review colloid **semiconductor** metal sulfide prepn; cadmium zinc **semiconductor** colloid prepn review; micelle reverse **semiconductor** colloid prepn review
- IT Sulfides, properties
(control of sulfide colloidal **semiconductor** particle prepn. in reverse micelle systems)
- IT **Semiconductor** materials
(colloidal, colloidal **semiconductor** particle prepn. in reverse micelle systems)
- IT Micelles
(reverse, control of IIB sulfide colloidal **semiconductor** particle prepn. in reverse micelle systems)
- IT 540-84-1, 2,2,4-Trimethylpentane 577-11-7, **Aerosol OT**
(control of IIB sulfide colloidal **semiconductor** particle prepn. in reverse micelle systems)
- IT 1306-23-6P, Cadmium sulfide, properties 1314-98-3P
, Zinc sulfide, properties
(control of IIB sulfide colloidal **semiconductor** particle prepn. in reverse micelle systems)

L64 ANSWER 18 OF 31 HCA COPYRIGHT 2003 ACS

124:160708 One- and two-step **spray** deposition of CdTe thin films using **nanoparticle** precursors. Pehnt, Martin; Schulz, Douglas L.; Curtis, Calvin J.; Moutinho, Helio R.; Swartzlander, Amy; Mason, Alice R.; Ginley, David S. (National Renewable Energy Laboratory, Golden, CO, 80401-3393, USA). AIP Conference Proceedings, 353(13th NREL Photovoltaics Program Review, 1995), 384-91 (English) 1996. CODEN: APCPCS. ISSN: 0094-243X. Publisher: AIP Press.

AB CdTe thin films were synthesized using CdTe **nanoparticle** precursors. Capped CdTe **nanoparticles** were prepd. by injection of a mixt. of CdMe₂, (n-C₈H₁₇)₃PTe and (n-C₈H₁₇)₃P into (n-C₈H₁₇)₃PO at elevated temps. and characterized by x-ray diffraction, UV-visible spectroscopy, TEM, TGA and energy dispersive x-ray spectroscopy. CdTe thin film deposition was accomplished by forming a colloidal suspension of CdTe **nanoparticles** in a suitable org. solvent and then **spraying** the colloid onto SnO₂-coated glass substrates at variable susceptor temps. (1-step process). A two-step process was performed where a low-temp. **spray** deposition (T = 150.degree.) was followed by sintering in air, forming gas or Ar at variable annealing temps. The 1-step process yielded smooth and dense CdTe thin films using growth temps. .apprx.200.degree. less than conventional **spray** pyrolysis approaches. CdTe films were characterized by x-ray diffraction, UV-visible spectroscopy, at. force microscopy, Auger electron spectroscopy and electron probe micro anal. An increase in crystallinity and av. grain size as detd. by x-ray diffraction was noted as growth temp. was increased from 240 to 300.degree... This temp. dependence of film grain size was further confirmed by at.

force microscopy with no remnant nanocryst. morphol. features detected. The films obtained by the two-step process showed a dependence of crystallinity on annealing temp. At. compns. detd. by Auger electron spectroscopy and electron probe microanal. showed nearly stoichiometric Cd and Te for both 1- (Tgr = 300.degree.) and two-step (Tanneal .gtoreq. 400.degree.) deposited films; however, C impurities, arising presumably from the capping agent, were also detected.

IT 1306-25-8, Cadmium telluride (CdTe), processes
(one- and two-step **spray** deposition of CdTe thin films
using **nanoparticle** precursors)

RN 1306-25-8 HCA

CN Cadmium telluride (CdTe) (9CI) (CA INDEX NAME)

Cd—Te

CC 75-1 (Crystallography and Liquid Crystals)
Section cross-reference(s): 76

ST **spray** deposition cadmium telluride **nanoparticle**
precursor

IT 1306-25-8, Cadmium telluride (CdTe), processes
(one- and two-step **spray** deposition of CdTe thin films
using **nanoparticle** precursors)

IT 506-82-1, Dimethylcadmium
(one- and two-step **spray** deposition of CdTe thin films
using **nanoparticle** precursors in mixt. of phosphine
derivs. and)

IT 78-50-2, Trioctylphosphine oxide 4731-53-7, Trioctylphosphine
30877-28-2
(one- and two-step **spray** deposition of CdTe thin films
using **nanoparticle** precursors in mixt. of phosphine
derivs., dimethylcadmium and)

L64 ANSWER 19 OF 31 HCA COPYRIGHT 2003 ACS

123:322979 Synthesis "in situ" in reverse micelles of silver sulfide
semiconductors. Motte, L.; Billoudet, F.; Cizeron, J.;
Pileni, M. P. (Laboratoire S.R.S.I., Univ. Pierre et Marie Curie,
Paris, 75005, Fr.). Progress in Colloid & Polymer Science,
98(Trends in Colloid and Interface Science IX), 189-92 (English)
1995. CODEN: PCPSD7. ISSN: 0340-255X. Publisher: Steinkopff.

AB Functionalized reverse micelles were used to control the size of
Ag₂S **nanosized** particles. The **sizes** (2-10
nm) of these crystallites varied linearly with H₂O content.
The particles were coated by dodecanethiol and extd. the from
micelles. The size of the particles dispersed in heptane was detd.
by SAXS expts. and compared to sizes detd. by TEM. Good agreement
between these 2 techniques was obtained. A drop of particles
previously dispersed in heptane was dried on a carbon grid. A
network of the particles forming monolayers of crystallites in a
hexagonal distribution appears.

IT 21548-73-2P, Silver sulfide

(silver sulfide **semiconductor nanoparticle**
in-situ synthesis in **Aerosol** OT reverse micelles)

RN 21548-73-2 HCA

CN Silver sulfide (Ag₂S) (8CI, 9CI) (CA INDEX NAME)

Ag-S-Ag

CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 76

ST silver sulfide **semiconductor nanoparticle**
micelle synthesis

IT **Semiconductor** materials

(colloidal, **semiconductor nanoparticle**
in-situ synthesis in **Aerosol** OT reverse micelles)

IT Micelles

(reverse, silver sulfide **semiconductor**
nano**particle** in-situ synthesis in **Aerosol** OT
reverse micelles)

IT 112-55-0, 1-Dodecanethiol

(dispersing agent; silver sulfide **semiconductor**
nano**particle** in-situ synthesis in **Aerosol** OT
reverse micelles)

IT 142-82-5, Heptane, uses

(redispersion solvent; silver sulfide **semiconductor**
nano**particle** in-situ synthesis in **Aerosol** OT
reverse micelles)

IT 540-84-1, Isooctane 577-11-7, **Aerosol** OT

(silver sulfide **semiconductor nanoparticle**
in-situ synthesis in **Aerosol** OT reverse micelles)

IT 21548-73-2P, Silver sulfide

(silver sulfide **semiconductor nanoparticle**
in-situ synthesis in **Aerosol** OT reverse micelles)

L64 ANSWER 20 OF 31 HCA COPYRIGHT 2003 ACS

123:322716 Surface structure and morphology of CdS thin films deposited
by **spray** pyrolysis. Golvanov, V.; Lantto, V.; Leppaevori,
S.; Uusimaeki, A.; Remes, J.; Frantti, J. (Microelectron. Lab.,
Univ. Oulu, Oulu, 90570, Finland). Materials Research Society
Symposium Proceedings, 355 (Evolution of Thin Film and Surface
Structure and Morphology), 507-12 (English) 1995. CODEN: MRSPDH.
ISSN: 0272-9172. Publisher: Materials Research Society.

AB CdS thin films with different compns. were deposited by electrospray
pyrolysis of CdCl₂ and (NH₂)₂CS solns. mixed in different
proportions. The diverse morphol. of the films was analyzed by
using AFM/SEM observations. The relative at. concns. of Cd and S
species in the bulk phase, and at the surface of the films were
estd. by using EDS and XPS quant. routines, resp. The surfaces of
all types of these films were enriched by metallic species and the
at. surface ratio of Cd/S was between 1.6 and 3.2. Chemisorption of
O and CO on the film surfaces at low temps. between 290 K and 500 K
was studied to get information about Cd surface sites for

chemisorption. Metallic surface species are considered as basic centers for chemisorption of CO and O₂ gases. Three different O species with different binding energies for O 1s electrons were found on the film surfaces. The electronic structure of the surface complex CO (together with its influence on the charge transfer reactions during excitation) are discussed in terms of a model based on the correlation between collective electronic characteristics of the crystal and local **quantum**-mech. parameters of the chemisorbed complex.

IT 1306-23-6, Cadmium sulfide, properties
 (AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)
 RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-3 (Surface Chemistry and Colloids)
 Section cross-reference(s): 75, 76, 79
 ST surface structure cadmium sulfide **spray** pyrolysis; film
 electronic geometric structure cadmium sulfide; oxygen carbon
 monoxide chemisorption cadmium sulfide
 IT Chemisorption
 Energy level, surface
 Surface structure
 (AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)
 IT Calcination
 (**spray**, AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)
 IT 1306-23-6, Cadmium sulfide, properties
 (AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)
 IT 62-56-6, Thiourea, processes 10108-64-2, Cadmium chloride
 (AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)
 IT 630-08-0, Carbon monoxide, properties 7782-44-7, Oxygen, properties
 (surface probe; AFM and XPS study of surface morphol. of CdS films deposited by **spray** pyrolysis and CO and O chemisorption effects on surface electronic structure)

L64 ANSWER 21 OF 31 HCA COPYRIGHT 2003 ACS
 121:313074 Fabrication of CdS **nanoparticles** embedded in a polymer film by gas-aerosol reactive electrostatic deposition technique. Salata, O. V.; Dobson, P. J.; Hull, P. J.;

Hutchison, J. L. (Department of Engineering Science, University of Oxford, Parks Road, Oxford, OX1 3PJ, UK). Thin Solid Films, 251(1), 1-3 (English) 1994. CODEN: THSFAP. ISSN: 0040-6090.

AB The prepn. is described of controlled CdS particles in a polyvinyl alc. film using gas-aerosol reactive electrostatic deposition. The optical properties and microstructure of the films are described.

IT 1306-23-6P, Cadmium sulfide (CdS), properties
(fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 76-3 (Electric Phenomena)

Section cross-reference(s): 37, 66, 75

ST fabrication cadmium sulfide **nanoparticle** polymer film

IT Ultraviolet and visible spectra
(fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

IT Coating process
(**spray**, electrostatic; fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

IT 1306-23-6P, Cadmium sulfide (CdS), properties
(fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

IT 9002-89-5, Polyvinyl alcohol
(fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

IT 7783-06-4, Hydrogen sulfide, reactions 10325-94-7, Cadmium nitrate
(fabrication of CdS **nanoparticles** embedded in polyvinyl alc. film by gas-aerosol reactive electrostatic deposition)

L64 ANSWER 22 OF 31 HCA COPYRIGHT 2003 ACS

121:264595 Mechanism of Formation of CdS and ZnS Ultrafine Particles in Reverse Micelles. Hirai, Takayuki; Sato, Hiroshi; Komazawa, Isao (Faculty of Engineering Science, Osaka University, Osaka, 560, Japan). Industrial & Engineering Chemistry Research, 33(12), 3262-6 (English) 1994. CODEN: IECRED. ISSN: 0888-5885.

AB The mechanism of formation of CdS and ZnS ultrafine particles in reverse micelles was studied by using Na bis(2-ethylhexyl) sulfosuccinate (AOT)/isooctane as a reverse micellar soln. The particle formation process was followed by observing the change in the UV-visible absorption spectra. The effects of reactant concn.

and H₂O content on the particle diam. were also studied. Particle formation by nucleation and growth occurred very rapidly and was complete within 0.02 s, followed by particle coagulation. The particle coagulation rate const. was controlled only by the intermicellar exchange rate, in the initial stage. With increasing particle diam., the coagulation was dominated by the statistical distribution of particles among the reverse micelles. As the diam. of particle approached that of the H₂O core in reverse micelle, the coagulation became restricted by the micellar size.

IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
 , Zinc sulfide, preparation
 (nanoparticles; UV spectral study of the mechanism of formation of CdS and ZnS ultrafine particles in Aerosol OT/isooctane reverse micelles)
 RN 1306-23-6 HCA
 CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1314-98-3 HCA
 CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

CC 66-4 (Surface Chemistry and Colloids)
 Section cross-reference(s): 76, 78
 ST **nanoparticle** formation mechanism cadmium zinc sulfide;
 reverse micelle **nanoparticle** form cadmium sulfide;
Aerosol OT isooctane micelle **nanoparticle**
 synthesis; **semiconductor nanoparticle** synthesis
 AOT reverse micelle; coagulation ultrafine particle synthesis
 reverse micelle
 IT Micelles
 (reverse, UV spectral study of the mechanism of formation of CdS and ZnS ultrafine particles in Aerosol OT/isooctane reverse micelles)
 IT 540-84-1, 2,2,4-Trimethylpentane 577-11-7, Aerosol OT
 (UV spectral study of the mechanism of formation of CdS and ZnS ultrafine particles in Aerosol OT/isooctane reverse micelles)
 IT 1313-82-2, Sodium sulfide (Na₂S), reactions 7779-88-6, Zinc
 nitrate 10325-94-7, Cadmium nitrate
 (UV spectral study of the mechanism of formation of CdS and ZnS ultrafine particles in Aerosol OT/isooctane reverse micelles)
 IT 1306-23-6P, Cadmium sulfide, preparation 1314-98-3P
 , Zinc sulfide, preparation
 (nanoparticles; UV spectral study of the mechanism of formation of CdS and ZnS ultrafine particles in Aerosol OT/isooctane reverse micelles)

L64 ANSWER 23 OF 31 HCA COPYRIGHT 2003 ACS

120:308160 Modifications of CdS **nanoparticle** characteristics through synthesis in reversed micelles and exposure to enhanced gas pressures and reduced temperatures. Karayigitoglu, Cigdem; Tata, Murthy; John, Vijay T.; McPherson, Gary L. (Dep. Chem. Eng., Tulane Univ., New Orleans, LA, 70118, USA). Colloids and Surfaces, A: Physicochemical and Engineering Aspects, 82(2), 151-62 (English) 1994. CODEN: CPEAEH. ISSN: 0927-7757.

AB CdS **nanoparticles** are synthesized to reversed micelles which are then subjected to enhanced pressures of a light hydrocarbon gas. At lower temps., clathrate hydrates form, reducing the micellar H2O content. The particles remain in sol. until a crit. phase transition pressure. The removal of H2O leads to an enhancement in particle stability and a resistance to photocorrosion. It is thus possible to prep. CdS particles of various band gap energies and to stabilize these particles subsequently, through a process of H2O removal and micelle size redn.

IT 1306-23-6P, Cadmium sulfide, preparation
(prepn. of **nanoparticles** of, in reversed micelles
pressurized with hydrocarbon gases)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-3 (Surface Chemistry and Colloids)
Section cross-reference(s): 73, 76, 78

ST **nanoparticle semiconductor** synthesis reversed
micelle; cadmium sulfide **nanoparticle** synthesis reversed
micelle; clathrate hydrate formation water removal micelle; enhanced
pressure light hydrocarbon gas micelle; photocorrosion stability
cadmium sulfide **nanoparticle** micelle

IT Hydrocarbons, miscellaneous
(gases, cadmium sulfide **nanoparticle** synthesis in
reversed micelles pressurized with)

IT Energy level, band structure
(of cadmium sulfide **nanoparticles**, synthesized in
reversed micelles pressurized with light hydrocarbon gases)

IT Inclusion reaction
(clathration, in reverse micelles pressurized with light
hydrocarbon gases, **semiconductor nanoparticle**
synthesis in relation to)

IT **Semiconductor** materials
(colloidal, prep. of, in light hydrocarbon gas-pressurized
reverse micelles)

IT Corrosion
(photochem., of cadmium sulfide **nanoparticles**,
synthesized in reversed micelles pressurized with light
hydrocarbon gases)

- IT Micelles
(reverse, light hydrocarbon gas-pressurized,
semiconductor nanoparticle synthesis in)
- IT 74-85-1, Ethene, miscellaneous
(micelles pressurized with, cadmium sulfide **nanoparticle**
synthesis in reverse)
- IT 540-84-1, Isooctane 577-11-7, **Aerosol OT**
(micelles, cadmium sulfide **nanoparticle** synthesis in
reverse, pressurized with hydrocarbon gases)
- IT **1306-23-6P**, Cadmium sulfide, preparation
(prepn. of **nanoparticles** of, in reversed micelles
pressurized with hydrocarbon gases)
- L64 ANSWER 24 OF 31 HCA COPYRIGHT 2003 ACS
117:220598 **Nanometer particles** synthesis in reverse
micelles: influence of the size and the surface on the reactivity.
Pileni, M. P.; Lisiecki, I.; Motte, L.; Petit, C. (Lab. SRSI, Univ.
Pierre et Marie Curie, Paris, 75005, Fr.). Research on Chemical
Intermediates, 17(2), 101-13 (English) 1992. CODEN: RCINEE. ISSN:
0922-6168.
- AB The synthesis in situ of **nanoparticles** in reverse micelles
is described. In the case of aggregates contg. Cu ions, it is
possible to form metallic particles surrounded or not by an oxide
layer. By mixing aggregates contg. Cd²⁺ and S²⁻ ions, CdS particles
are formed. The size and polydispersity of the particles are
controlled. The photoelectron transfer reaction depends mainly on
the surface compn. In the range of 1-5 nm, the efficiency in the
electron transfer does not depend on the size of the particle. The
reverse micelles are formed by using either **aerosol OT**
(AOT) or mixed bivalent di(2-Et hexyl)sulfosuccinate and AOT.
- IT **1306-23-6**, Cadmium sulfide, properties
(**nanoparticles** of, prepd. in reverse micelles)
- RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)
- Cd=S
- CC 66-2 (Surface Chemistry and Colloids)
Section cross-reference(s): 72, 74, 76
- ST micelle synthesis **nanoparticle semiconductor**
photochem redox; cadmium sulfide **nanoparticle** synthesis
reverse micelle; copper **nanoparticle** reverse micelle
synthesis
- IT **Semiconductor** materials
(**nanoparticles**, reverse micelle synthesis of)
- IT Redox reaction
(photochem., in reverse micelles, **nanoparticle**
synthesis in relation to)
- IT Micelles
(reverse, **nanoparticle** synthesis in)
- IT 13478-98-3, Hexametaphosphate

- (colloid particles protected with, **nanoparticle** synthesis in reverse micelles in relation to)
- IT 577-11-7, **Aerosol** (OT)
(micelles, **nanoparticle** synthesis in reversed)
- IT 1306-23-6, Cadmium sulfide, properties 7440-50-8, Copper, properties
(**nanoparticles** of, prepd. in reverse micelles)
- IT 70846-74-1 124461-79-6
(reverse micelles contg., **nanoparticle** synthesis in relation to)

L64 ANSWER 25 OF 31 HCA COPYRIGHT 2003 ACS

116:136748 Addition of ferrocene derivatives to the surface of **quantum**-confined cadmium sulfide clusters: steady-state and time-resolved photophysical effects. Chandler, Robin R.; Coffey, Jeffery L.; Atherton, Stephen J.; Snowden, Paul T. (Dep. Chem., Texas Christian Univ., Fort Worth, TX, 76129, USA). Journal of Physical Chemistry, 96(6), 2713-17 (English) 1992. CODEN: JPCHAX. ISSN: 0022-3654.

AB The effect of substituted ferrocene complexes on the surface of **quantum**-confined (Q) CdS clusters in inverse micelles was examd. by steady-state and time-resolved photoluminescence (PL) spectroscopy. Addn. of (dimethylamino)methylferrocene (DMAMF) to Q-CdS enhanced cluster PL peak areas by 120%, in contrast to the carboxylic acid derivs. ferrocenecarboxylic acid (FCA) and ferrocenedicarboxylic acid (FDCA), which quenched PL by 60% and 80%, resp. Unsubstituted ferrocene, hydroxymethylferrocene, and ferrocenecarboxaldehyde had no effect on the PL intensity of these clusters. The induced PL changes fit a Langmuir-type adsorption isotherm from which formation consts. for the Q-CdS:surface adducts were calcd. The av. log Kf value calcd. for DMAMF adsorption was 4.12. The FCA addn. gave an av. log Kf of 5.17, and the av. log Kf value for FDCA addn. was 6.14. Binding of the amino group of DMAMF to shallow trap states arising from Cd²⁺ sites is postulated as the mechanism for PL enhancement, while the quenching mechanism for FCA and FDCA is attributed to proton transfer induced from ionization of the acids in the micelle water pools. "Competition" expts. show that quenching by the carboxylic acid derivs. can be reversed by the addn. of amino-substituted ferrocene, and vice versa. The results also suggest a possible DMAMF-induced surface reconstruction. These steady-state observations are supported by measurements of the PL decay via subnanosecond time-correlated single photon counting. Fits of the decay monitored at 620 nm to a modified stretched exponential model indicate that the av. distributed decay time .ltbbrac..tau.2.rtbbrac. of nanosecond duration can be either lengthened or shortened, depending on the nature of the added ferrocene.

- IT 1306-23-6, Cadmium sulfide, properties
(absorption of ferrocenes on **quantum**-confined clusters of, in reversed micelles, luminescence in relation to)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 66-2 (Surface Chemistry and Colloids)
Section cross-reference(s): 73, 74, 76
- ST micelle reverse cadmium sulfide **quantum** cluster;
luminescence ferrocene adsorbed **quantum** cluster micelle;
carboxylic acid ferrocene adsorbed **quantum** cluster
- IT Luminescence
Luminescence quenching
(of cadmium sulfide **quantum**-confined clusters, in
reverse micelles, ferrocene adsorption effects on)
- IT Adsorption
(of ferrocene carboxylic acids and related compds., on surfaces
of cadmium sulfide **quantum**-confined clusters in reverse
micelles)
- IT Micelles
(reverse, cadmium sulfide **quantum**-confined clusters in,
ferrocene adsorption on)
- IT 1306-23-6, Cadmium sulfide, properties
(absorption of ferrocenes on **quantum**-confined clusters
of, in reversed micelles, luminescence in relation to)
- IT 102-54-5, Ferrocene 1271-42-7, Ferrocene carboxylic acid
1271-86-9, Dimethylaminomethylferrocene 1273-86-5,
Hydroxymethylferrocene 1293-87-4, 1,1'-Ferrocenedicarboxylic acid
12093-10-6, Ferrocene carboxaldehyde
(adsorption of, on cadmium sulfide **quantum**-confined
clusters in reversed micelles)
- IT 142-82-5, Heptane, properties 577-11-7, Aerosol OT
(micelles, cadmium sulfide **quantum**-confined clusters in
reverse)
- L64 ANSWER 26 OF 31 HCA COPYRIGHT 2003 ACS
- 112:84948 Nucleation and growth of cadmium selenide on zinc sulfide
quantum crystallite seeds, and vice versa, in inverse
micelle media. Kortan, A. R.; Hull, R.; Opila, R. L.; Bawendi, M.
G.; Steigerwald, M. L.; Carroll, P. J.; Brus, Louis E. (AT and T
Bell Lab., Murray Hill, NJ, 07974, USA). Journal of the American
Chemical Society, 112(4), 1327-32 (English) 1990. CODEN: JACSAT.
ISSN: 0002-7863.
- AB Composite **semiconductor quantum** crystallites
involving CdSe grown on an ZnS seed, and vice versa, were
synthesized and "capped" with org. ligands in inverse micelle solns.
These composite particles, as well as capped seed crystallites of
CdSe and ZnS, are isolated, purified, and characterized for relative
at. compn., structure, and electronic properties. The Debye x-ray
scattering equation, when solved for these layered particles, shows
that powder x-ray scattering is insensitive to a small foreign
inclusion. A simple theor. model for the LUMO and HOMO of layered
crystallites shows that a small (<15-Å diam.) interior foreign
seed causes only small shifts of the lowest excited state, to either

higher or lower energies. The capped CdSe seed and the capped CdSe portion of the layered particle grown on a ZnS seed undergo low-temp. (169.degree.) annealing to give near-single-crystal x-ray scattering. However, CdSe annealing is blocked by a surface ZnS layer which is 4 .ANG. thick. While growth to make composite particles does occur, neither particle shows evidence for epitaxial growth.

IT 1314-98-3, Zinc sulfide, properties
(crystal growth of, on cadmium selenide **quantum** seeds
in reverse micelles)
RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S—Zn

IT 1306-24-7, Cadmium selenide, properties
(crystal growth of, on zinc sulfide **quantum** crystallite
seeds in reverse micelles)
RN 1306-24-7 HCA
CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd—Se

CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 73, 75, 76
ST **semiconductor** colloid crystal micelle nucleation; cadmium
selenide colloid crystal micelle; zinc sulfide colloid crystal
micelle; reverse micelle growth colloid **semiconductor**
IT Electron configuration
(of **semiconductor quantum** crystallites, grown
in reverse micelles)
IT Crystal growth
(of **semiconductor quantum** crystals, in
reverse micelles)
IT **Semiconductor** materials
(**quantum** crystallites, grown in reverse micelles)
IT Micelles
(reverse, **semiconductor quantum** crystallite
growth in)
IT 1314-98-3, Zinc sulfide, properties
(crystal growth of, on cadmium selenide **quantum** seeds
in reverse micelles)
IT 1306-24-7, Cadmium selenide, properties
(crystal growth of, on zinc sulfide **quantum** crystallite
seeds in reverse micelles)
IT 142-82-5, Heptane, uses and miscellaneous 577-11-7,
Aerosol OT
(micelles, **semiconductor quantum** crystallite
growth in reverse)
IT 6865-39-0, Zinc thiophenolate 120138-29-6

(surface, capping layered **semiconductor quantum**
crystallites grown in reverse micelles)

L64 ANSWER 27 OF 31 HCA COPYRIGHT 2003 ACS

111:223625 Method of forming a **quantum** dot structure. Dobson,
Peter James (Philips Electronic and Associated Industries Ltd., UK;
N. V. Philips' Gloeilampenfabrieken). Eur. Pat. Appl. EP 328202 A2
19890816, 10 pp. DESIGNATED STATES: R: DE, FR, GB, NL. (English).
CODEN: EPXXDW. APPLICATION: EP 1989-200251 19890206. PRIORITY: GB
1988-3295 19880212.

AB Methods for forming **quantum** dot structures (e.g., for
semiconductor lasers) entail forming a suspension of
particles of a **semiconductor** material and directing laser
radiation of a wavelength selected to interact resonantly with
particles of a given size (e.g., 2-200 nm in diam.) through the
suspension to induce deposition of the particles onto a substrate.
The suspension may be a colloidal suspension or it may be a smoke
produced by sublimation of the **semiconductor** material in
an inert atm.

IT 1306-23-6, Cadmium sulfide (CdS), uses and miscellaneous
1306-24-7, Cadmium selenide (CdSe), uses and miscellaneous
1314-84-7, Zinc phosphide (Zn3P2) 1314-98-3, Zinc
sulfide (ZnS), uses and miscellaneous 1315-09-9, Zinc
selenide (ZnSe) 12014-28-7, Cadmium phosphide (Cd3P2)
(**quantum** dot structure formation by laser-induced
deposition of particles from suspensions of)

RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1306-24-7 HCA
CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

RN 1314-84-7 HCA
CN Zinc phosphide (Zn3P2) (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

RN 1315-09-9 HCA
CN Zinc selenide (ZnSe) (9CI) (CA INDEX NAME)

Se=Zn

RN 12014-28-7 HCA
 CN Cadmium phosphide (Cd3P2) (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====		
P	2	7723-14-0
Cd	3	7440-43-9

IC ICM H01L021-265

ICS C30B023-00

CC 76-3 (Electric Phenomena)

Section cross-reference(s): 73

ST **quantum** dot formation laser induced deposition;
semiconductor laser **quantum** dot formation

IT Laser radiation, chemical and physical effects
 (deposition induced by, from suspensions of **semiconductor**
 particles, in **quantum** dot structure formation)

IT **Aerosols**

Colloids

Suspensions

(laser-induced deposition from, in **quantum** dot
 structure formation)

IT **Semiconductor** materials

Group IIIA element pnictides

(**quantum** dot structure formation by laser-induced
 deposition of particles from suspensions of)

IT **Semiconductor** devices

(**quantum** dot structure formation for, by laser-induced
 deposition of **semiconductor** particles from suspensions)

IT Acrylic polymers, uses and miscellaneous

Polyimides, uses and miscellaneous

(**quantum** dot structures from laser-induced deposition
 of **semiconductor** particles on)

IT Lasers

(**semiconductor**, **quantum** dot structure
 formation for, by laser-induced deposition of
semiconductor particles from suspensions)

IT 1303-00-0, Gallium arsenide, uses and miscellaneous 1306-19-0,
 Cadmium oxide (CdO), uses and miscellaneous 1306-23-6,
 Cadmium sulfide (CdS), uses and miscellaneous 1306-24-7,
 Cadmium selenide (CdSe), uses and miscellaneous 1312-43-2, Indium
 oxide (In2O3) 1314-13-2, Zinc oxide (ZnO), uses and miscellaneous
 1314-84-7, Zinc phosphide (Zn3P2) 1314-87-0, Lead sulfide
 (PbS) 1314-98-3, Zinc sulfide (ZnS), uses and
 miscellaneous 1315-09-9, Zinc selenide (ZnSe) 7440-21-3,
 Silicon, uses and miscellaneous 7782-49-2, Selenium, uses and
 miscellaneous 12014-28-7, Cadmium phosphide (Cd3P2)
 12030-24-9, Indium sulfide (In2S3) 12056-07-4, Indium selenide
 (In2Se3) 12069-00-0, Lead selenide (PbSe) 22398-80-7, Indium
 phosphide, uses and miscellaneous

- (quantum dot structure formation by laser-induced deposition of particles from suspensions of)
- IT 9011-14-7, Poly(methyl methacrylate)
(quantum dot structures from laser-induced deposition of semiconductor particles on)
- L64 ANSWER 28 OF 31 HCA COPYRIGHT 2003 ACS
- 108:193286 Surface derivatization and isolation of **semiconductor** cluster molecules. Steigerwald, M. L.; Alivisatos, A. P.; Gibson, J. M.; Harris, T. D.; Kortan, R.; Muller, A. J.; Thayer, A. M.; Duncan, T. M.; Douglass, D. C.; Brus, L. E. (AT and T Bell Lab., Murray Hill, NJ, 07974, USA). Journal of the American Chemical Society, 110(10), 3046-50 (English) 1988. CODEN: JACSAT. ISSN: 0002-7863.
- AB **Nanometer-sized** CdSe clusters were synthesized by using organometallic reagents in inverse micellar soln. and chem. modification of the surface of these cluster compds. It is shown how the clusters grow in presence of added reagents and how the surface may be terminated and passivated by the addn. of organoselenides. Passivation of the surface allows for the removal of the cluster mols. from the reaction medium and the isolation of organometallic mols. which are zinc blende CdSe clusters terminated by covalently attached org. ligands. Preliminary cluster characterization via resonance Raman, IR and NMR spectroscopy, x-ray diffraction, TEM, and size-exclusion chromatog. is reported.
- IT 1306-24-7, Cadmium selenide, properties
(colloidal **nanometer-size** clusters, formed in inverse micellar solns.)
- RN 1306-24-7 HCA
- CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)
- Cd=Se
- CC 66-4 (Surface Chemistry and Colloids)
- ST cadmium selenide colloid cluster prepn; micelle synthesis **semiconductor** colloid; org capped **semiconductor** colloid cluster; **nanometer size** cadmium selenide colloid
- IT **Semiconductor** materials
(**nanometer-size** clusters, formed in inverse micellar solns. and capped by organometallic reagents)
- IT Colloids
(of **semiconductors**, formed by synthesis in inverse micellar solns.)
- IT Micelles
(reverse, **semiconductor nanometer-size** cluster synthesis in)
- IT 1306-24-7, Cadmium selenide, properties
(colloidal **nanometer-size** clusters, formed in inverse micellar solns.)
- IT 577-11-7, Aerosol OT

- (micelles, **semiconductor nanometer-size** cluster synthesis in inverse)
- IT 142-82-5, Heptane, uses and miscellaneous
(micelles, **semiconductor nanometer-size** colloid cluster prepn. in inverse)
- IT 4099-46-1 33861-17-5 80594-86-1
(reaction of, in colloid **nanometer-size** cluster prepn. in inverse micellar solns.)
- L64 ANSWER 29 OF 31 HCA COPYRIGHT 2003 ACS
- 108:85185 Photochemistry of colloidal **semiconductors**. 24.
Interparticle electron transfer in cadmium phosphide-zinc oxide sandwich structures. Spanhel, Lubomir; Henglein, Arnim; Weller, Horst (Bereich Strahlenchem., Hahn-Meitner-Inst. Berlin, Berlin, 1000/39, Fed. Rep. Ger.). Berichte der Bunsen-Gesellschaft, 91(12), 1359-63 (English) 1987. CODEN: BBPCAX. ISSN: 0005-9021.
- AB Colloidal solns. of Q-Cd3P2 particle (Q = **quantum** mech. effect) of different particle size were illuminated with visible light. The solns. also contained colloidal TiO2 or ZnO. The fluorescence of Cd3P2 was quenched by the oxide colloids. The rate of the photo-anodic corrosion in **aerated** soln. was drastically increased by TiO2, the **quantum** yield being 0.7. These effects are explained in terms of improved charge sepn. by rapid electron transfer from illuminated Cd3P2 into the conduction band of TiO2 or ZnO particles that are bonded to the Cd3P2 particles. Electron injection into ZnO was more efficient for Q-Cd3P2 particles of smaller size. This is attributed to the shift of the conduction band to more neg. potentials in these particles. The injected electrons caused a blue-shift of the absorption threshold of the ZnO part of the Cd3P2-ZnO sandwich structure.
- IT 55965-40-7, Cadmium phosphide
(interparticle photoinduced electron transfer in colloid sandwich structures of titanium dioxide or zinc oxide and)
- RN 55965-40-7 HCA
- CN Cadmium phosphide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
P	x	7723-14-0
Cd	x	7440-43-9

- CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
Section cross-reference(s): 66, 76
- ST colloid **semiconductor** photochem electron transfer; cadmium phosphide colloid photochem electron transfer; zinc oxide colloid photochem electron transfer; titanium oxide colloid photochem electron transfer; oxide colloid photochem electron transfer
- IT Particle size
(control of, in interparticle photoinduced electron transfer in colloid **semiconductor** sandwich structures)

- IT Photochemistry
(of colloid **semiconductors**)
- IT Energy level, band structure
(conduction, particle size control in interparticle photoinduced electron transfer in colloid **semiconductor** sandwich structures in relation to)
- IT Colloids
(**semiconductive**, photochem. of)
- IT 55965-40-7, Cadmium phosphide
(interparticle photoinduced electron transfer in colloid sandwich structures of titanium dioxide or zinc oxide and)

L64 ANSWER 30 OF 31 HCA COPYRIGHT 2003 ACS

107:201985 Spectral response of cadmium zinc sulfide-polyacetylene heterojunction. Modeling by Onsager recombination process. Youm, I.; Laplaze, D.; Cadene, M.; N'Goran, Y. (Lab. Semicond., Fac. Sci., Dakar, Senegal). Comm. Eur. Communities, [Rep.] EUR, EUR 10939, E. C. Photovoltaic Sol. Energy Conf., 7th, 1986, 641-5 (English) 1987. CODEN: CECED9.

AB Thin film photovoltaic junctions were obtained by a direct polymn. of p-type doped polyacetylene ((CH)x) on a **sprayed** polycryst. CdZnS film. Elec. and optical measurements, were carried out for different Zn compns. and different (CH)x thicknesses to improve efficiency under illumination. The dark forward biased current-voltage characteristics as a function of temp. can be explained by a tunneling mechanism of the elec. conduction. Under air-mass illumination 1 at 25.degree., the open circuit voltage increases from 300 mV for CdS/(CH)x to 450 mV for Cd_{0.75}Zn_{0.25}S/(CH)x. The spectral response exhibits, at low energy, an exponential decrease of the relative **quantum** efficiency that cannot be interpreted by classical heterojunction treatment. A geminate recombination process in the polymer has been used to describe this behavior.

IT 12442-27-2, Cadmium zinc sulfide (CdZnS)
(photoelec. solar cells contg. polyacetylene and, characteristics of, component stoichiometry effect on)

RN 12442-27-2 HCA

CN Cadmium zinc sulfide ((Cd,Zn)S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
S	1	7704-34-9
Zn	0 - 1	7440-66-6
Cd	0 - 1	7440-43-9

IT 1306-23-6, uses and miscellaneous 37246-65-4
(photoelec. solar cells contg. polyacetylene and, efficiency of, zinc doping in relation to)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 37246-65-4 HCA

CN Cadmium zinc sulfide (Cd0.75Zn0.25S) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
S	1	7704-34-9
Zn	0.25	7440-66-6
Cd	0.75	7440-43-9

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76

IT 12442-27-2, Cadmium zinc sulfide (CdZnS)
(photoelec. solar cells contg. polyacetylene and, characteristics
of, component stoichiometry effect on)

IT 1306-23-6, uses and miscellaneous 37246-65-4
(photoelec. solar cells contg. polyacetylene and, efficiency of,
zinc doping in relation to)

L64 ANSWER 31 OF 31 HCA COPYRIGHT 2003 ACS

107:187017 Photochemistry of **semiconductor** colloids. 22.

Electron ejection from illuminated cadmium sulfide into attached titanium and zinc oxide particles. Spanhel, Lubomir; Weller, Horst; Henglein, Arnim (Bereich Strahlenchem., Hahn-Meitner-Inst. Berlin, Berlin, 1000/39, Fed. Rep. Ger.). Journal of the American Chemical Society, 109(22), 6632-5 (English) 1987. CODEN: JACSAT. ISSN: 0002-7863.

AB Colloidal solns. of CdS contg. colloidal TiO₂ or ZnO were illuminated with visible light. The fluorescence of CdS (decay time .apprx.50 ns) was quenched by TiO₂, several TiO₂ particles being required per CdS particles. The rate of photoanodic corrosion in **aerated** soln. was drastically increased in the presence of TiO₂. In deaerated CdS solns. contg. MeOH Cd²⁺ ions, Cd metal was formed when TiO₂ was present. Methylviologen was reduced with a **quantum** yield of .apprx.1 while it reached .apprx.10 times more slowly in the absence of TiO₂. These effects are explained in terms of improved charge sepn. by rapid electron injection from illuminated CdS into the conduction band of attached TiO₂ particles. Electron injection into ZnO was less efficient and occurred only in the case of Q-CdS particles (very small particles having a greater band gap). The injected electrons caused a blue shift of the absorption threshold of ZnO.

IT 1306-23-6, Cadmium sulfide, reactions
(photolysis of colloids solns. contg., electron ejection from,
into titanium dioxide or zinc oxide particles in)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 74-1 (Radiation Chemistry, Photochemistry, and Photographic and Other Reprographic Processes)
- ST photolysis colloid cadmium sulfide; titanium oxide cadmium sulfide photochem; zinc oxide cadmium sulfide photochem; photocatalyst colloidal **semiconductor** particle; electron ejection excited cadmium sulfide
- IT 1306-23-6, Cadmium sulfide, reactions
(photolysis of colloids solns. contg., electron ejection from, into titanium dioxide or zinc oxide particles in)

=> d his 165-

FILE 'HCA' ENTERED AT 11:06:20 ON 23 MAY 2003
L65 9 S L59 AND (L47 OR L48)

=> d 165 1-9 cbib abs hitstr hitind

- L65 ANSWER 1 OF 9 HCA COPYRIGHT 2003 ACS
136:378038 Shock synthesis of nanocrystalline high-pressure phases in **semiconductors** by high-velocity thermal **spray**.
Goswami, R.; Parise, J.; Herman, H.; Sampath, S.; Gambino, R.; Zhu, Y.; Welch, D. (Center for Thermal Spray Research, Dept. of Materials Sci. & Engg., Energy Sciences and Technology Department, Brookhaven National Laboratory, SUNY at Stony Brook, Upton, NY, USA).
Materials Research Society Symposium Proceedings, 638 (Microcrystalline and Nanocrystalline Semiconductors--2000), F15.1.1-F15.1.6 (English) 2001. CODEN: MRSPDH. ISSN: 0272-9172. Publisher: Materials Research Society.
- AB Shock synthesis of nanocryst. Si, Ge and CdTe was accomplished using high-velocity thermal **spray**. Si or Ge powders were injected into a high energy flame, created by a thermal **spray** gun, where the particles melt and accelerate to impact on a substrate. The shock wave generated by the sudden impact of the droplets propagated through the underlying deposits, which induces a phase transition to a high pressure form. The decompression of the high-pressure phase gave several metastable phases, as evidenced by TEM and x-ray diffraction studies. The peak pressure is .apprxeq.23GPa with a pulse duration of 1-5 ns. TEM revealed that the metastable phases of Si with a size range of 2 to 5 nm were dispersed within Si-I. In Ge, a metastable phase, ST-12, was obsd. This is a decompression product of Ge-II which possesses the .beta.-Sn type of structure. In the case of CdTe, a fine dispersion of hexagonal CdTe particles, embedded in cubic-CdTe with an av. size of 2 nm was obtained.
- IT 1306-25-8, Cadmium telluride (CdTe), properties
(shock synthesis of nanocryst. high-pressure phases in

semiconductors by high-velocity thermal **spray**)

RN 1306-25-8 HCA

CN Cadmium telluride (CdTe) (9CI) (CA INDEX NAME)

Cd=Te

CC 76-3 (Electric Phenomena)

ST high pressure phase **semiconductor** shock synthesis

IT Phase transition

Semiconductor materials

Shock wave

Transmission electron microscopy

X-ray diffraction

(shock synthesis of nanocryst. high-pressure phases in **semiconductors** by high-velocity thermal **spray**)

IT 1306-25-8, Cadmium telluride (CdTe), properties 7440-21-3,
 Silicon, properties 7440-56-4, Germanium, properties
 (shock synthesis of nanocryst. high-pressure phases in
semiconductors by high-velocity thermal **spray**)

L65 ANSWER 2 OF 9 HCA COPYRIGHT 2003 ACS

136:282995 **Spray** pyrolysis deposition of copper indium
 disulfide thin films. Fujiwara, Takeshi; Okuya, Masayuki; Kaneko,
 Shoji (Materials Structures Lab., Tokyo Inst. Technology, 4259,
 Nagatsuta-cho, Midori-ku, Yokohama-shi, 226-8503, Japan). Journal
 of the Ceramic Society of Japan, 110(Feb.), 81-85 (English) 2002.
 CODEN: JCSJEW. ISSN: 0914-5400. Publisher: Ceramic Society of
 Japan.

AB Copper indium disulfide (CuInS₂) thin films were successfully prepd.
 from non-chlorinated starting materials on glass substrates by a
spray pyrolysis deposition (SPD) method. The **spray**
 solns. were composed of water-ethanol (1:1 in vol.) including copper
 acetate, indium acetylacetonate, and thiourea. The exptl.
 parameters for the stoichiometric and well-crystd. CuInS₂ thin film
 formation were detd. as follows: **spraying** rate 1.0 mL/s,
spraying period 0.5 s, substrate temp. 350.degree.C, and
 S/(Cu + In) ratio of the **spray** soln. 1.25. The dark brown
 CuInS₂ thin film obtained was composed of rounded grains 1-3 .
 mu.m in **size** with a direct band gap of 1.48 eV.
 The CuInS₂/CdS heterojunction fabricated by the SPD method presented
 photovoltaic characteristics, though the current was only 5 .mu.A.

IT 1306-23-6, Cadmium sulfide (CdS), properties
 (heterojunctions; **spray** pyrolysis deposition and
 properties of CuInS₂ thin films and properties of CuInS₂/CdS
 heterojunction prepd. from it)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

- CC 57-2 (Ceramics)
 Section cross-reference(s): 73, 76
- ST copper indium sulfide film **spray** pyrolysis deposition
 property; photovoltaic property copper indium sulfide cadmium
 sulfide heterojunction
- IT Band gap
 Electric current-potential relationship
 Grain size
 IR spectra
 (**spray** pyrolysis deposition and properties of CuInS₂
 thin films and properties of CuInS₂/CdS heterojunction prepd.
 from it)
- IT Calcination
 (**spray**; **spray** pyrolysis deposition and
 properties of CuInS₂ thin films and properties of CuInS₂/CdS
 heterojunction prepd. from it)
- IT 12018-94-9P, Copper indium sulfide (CuInS₂)
 (films and heterojunctions; **spray** pyrolysis deposition
 and properties of CuInS₂ thin films and properties of CuInS₂/CdS
 heterojunction prepd. from it)
- IT 1306-23-6, Cadmium sulfide (CdS), properties
 (heterojunctions; **spray** pyrolysis deposition and
 properties of CuInS₂ thin films and properties of CuInS₂/CdS
 heterojunction prepd. from it)
- IT 62-56-6, Thiourea, processes 142-71-2, Copper diacetate
 14405-45-9, Indium acetylacetonate
 (precursor; **spray** pyrolysis deposition and properties
 of CuInS₂ thin films and properties of CuInS₂/CdS heterojunction
 prepd. from it)

L65 ANSWER 3 OF 9 HCA COPYRIGHT 2003 ACS

136:109951 Particle guidance system. Renn, Michael J.; Essien,
 Marcelino; Ferguson, Kevin; King, Bruce; Marquez, Greg; Seigal, Pam;
 Giridharan, Manampathy G.; Sheu, Jyh-Cherng (Optomec Design Company,
 USA). PCT Int. Appl. WO 2002004698 A2 20020117, 84 pp. DESIGNATED
 STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA,
 CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM,
 HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,
 LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD,
 SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW,
 AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH,
 CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR,
 NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2.
 APPLICATION: WO 2001-US14841 20010530. PRIORITY: US 2000-584997
 20000601.

- AB App. for the laser-guided deposition of material on a substrate
 comprising a chamber contg. a fluid, means for introducing into the
 chamber particulate material to be deposited and a laser beam
 arranged to pass through the chamber and to guide the particulate
 material towards a chamber exit directed towards the substrate are
 described which are provided with means for producing in the chamber
 a flow of fluid which propels the particulate material towards the

chamber exit. Particles with **sizes** in the **micron** region, including solids, solid dielecs., **semiconductors**, liqs., **aerosols**, and living cells may be conveyed. Precursors for a desired material (e.g., as a soln.) may also be transported using the app. Living cells may be in a supporting-fluid media which contains nutrients for cell maintenance and growth. Methods for depositing materials to form two-dimensional and three-dimensional structures, including optical and electronic structures, are also described.

IT 1306-23-6, Cadmium sulfide, uses 1306-25-8, Cadmium telluride, uses
(particle guidance systems using laser light pressure for transport and deposition of)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1306-25-8 HCA

CN Cadmium telluride (CdTe) (9CI) (CA INDEX NAME)

Cd=Te

IC ICM C23C016-48

CC 73-12 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 9, 75, 76

IT 1306-23-6, Cadmium sulfide, uses 1306-25-8, Cadmium telluride, uses 1312-43-2, Indium oxide 1344-28-1, Alumina, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-16-6, Rhodium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7647-14-5, Salt, uses 7681-11-0, Potassium iodide, uses 9003-53-6, Polystyrene 12047-27-7, Barium titanate (BaTiO₃), uses 12735-99-8
(particle guidance systems using laser light pressure for transport and deposition of)

L65 ANSWER 4 OF 9 HCA COPYRIGHT 2003 ACS

132:139735 Electrostatic assisted **aerosol** jet deposition of CdS, CdSe and ZnS thin films. Su, B.; Choy, K. L. (Department of Materials, Imperial College of Science, Technology and Medicine, London, UK). Thin Solid Films, 361-362, 102-106 (English) 2000. CODEN: THSFAP. ISSN: 0040-6090. Publisher: Elsevier Science S.A..

AB A high-frequency deposition technique, electrostatic assisted **aerosol** jet deposition, has been used to prep. CdS, CdSe, and ZnS thin films in an open atm. The electrostatic assisted **aerosol** jet deposition method exhibited a higher deposition efficiency and film growth than conventional **spray** pyrolysis and chem. vapor deposition methods. The CdS and ZnS films

produced using the electrostatic assisted **aerosol** jet deposition process showed a strong preferred orientation. Fine cryst. CdS and CdSe (grain size <200 nm) films were formed at temps. as low as 300.degree.. ZnS film required a higher deposition temp. (>450.degree.) which resulted in large grain size (grain size .apprx.500 nm). The optical properties of the CdS and CdSe showed that their bandgap values were very close to the values reported in literature, indicating their potentials for the photovoltaic applications.

IT 1306-23-6, Cadmium sulfide, processes 1306-24-7,
Cadmium selenide, processes 1314-98-3, Zinc sulfide,
processes
(electrostatic assisted **aerosol** jet deposition of
cadmium sulfide, cadmium selenide, and zinc sulfide thin films)
RN 1306-23-6 HCA
CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

RN 1306-24-7 HCA
CN Cadmium selenide (CdSe) (9CI) (CA INDEX NAME)

Cd=Se

RN 1314-98-3 HCA
CN Zinc sulfide (ZnS) (9CI) (CA INDEX NAME)

S=Zn

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76

ST cadmium sulfide film electrostatic assisted **aerosol** jet
deposition; cadmium selenide film electrostatic assisted
aerosol jet deposition; zinc sulfide film electrostatic
assisted **aerosol** jet deposition; solar cell selenide
sulfide film deposition

IT **Aerosols**
Jets

(electrostatic assisted **aerosol** jet deposition of
cadmium sulfide, cadmium selenide, and zinc sulfide thin films)

IT 1306-23-6, Cadmium sulfide, processes 1306-24-7,
Cadmium selenide, processes 1314-98-3, Zinc sulfide,
processes
(electrostatic assisted **aerosol** jet deposition of
cadmium sulfide, cadmium selenide, and zinc sulfide thin films)

L65 ANSWER 5 OF 9 HCA COPYRIGHT 2003 ACS
130:160494 Particle manipulation and surface patterning by laser
guidance. Renn, Michael J.; Pastel, Robert (Department of Physics,

Michigan Technological University, Houghton, MI, 49931, USA).
 Journal of Vacuum Science & Technology, B: Microelectronics and
 Nanometer Structures, 16(6), 3859-3863 (English) 1998. CODEN:
 JVTBD9. ISSN: 0734-211X. Publisher: American Institute of Physics.

AB Laser-induced forces are used to manipulate atoms, clusters, and
micron-sized particles in hollow optical
 fibers. Laser light (400 mW, 800 nm) is guided in a low-order
 grazing incidence mode in glass capillaries. The optical field in
 the fiber generates gradient and scattering forces which
 simultaneously draw particles to the center of the hollow region and
 push them along the fiber axis. Dielec., **semiconductor**,
 and metal particles in the size range of 9 .mu.m-50 nm have been
 guided in gas- and liq.-filled fibers. Rb atoms are guided in
 evacuated fiber for up to 15 cm. Used alone or in conjunction with
 traditional methods, laser guidance is attractive for direct-write
 lithog. Arbitrary surface patterns can be created under ambient
 conditions with potential write speeds exceeding 106 particles/s and
 placement accuracy approaching 50 nm (assuming a 1 W laser, 100
nm Ge particles, and fiber filled with Ar at 760
 Torr). Anisotropic optical forces resulting from particle shape
 anisotropy act to orient particles in the fiber. In initial expts.
 NaCl and KI crystals in **aerosol** suspension have been
 funneled into a hollow fiber using optical forces. The crystals
 have been directed onto a glass surface and lines as narrow as 0.5
 .mu.m drawn. This linewidth is 30 times smaller than the inner
 fiber diam. and illustrates the strong focusing produced by optical
 forces. At. force microscopy images show a high degree of alignment
 between crystals suggesting that anisotropic optical forces act to
 orient the crystals during deposition.

IT 1306-23-6, Cadmium sulfide, uses
 (micron-sized particle manipulation
 and surface patterning by hollow-fiber laser guidance in
 direct-write lithog.)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 74-5 (Radiation Chemistry, Photochemistry, and Photographic and
 Other Reprographic Processes)

IT Lithography
 (direct-write; **micron-sized particle**
 manipulation and surface patterning by hollow-fiber laser
 guidance in)

IT 1306-23-6, Cadmium sulfide, uses 7429-90-5, Aluminum, uses
 7440-17-7, Rubidium, uses 7440-21-3, Silicon, uses 7440-56-4,
 Germanium, uses 7440-57-5, Gold, uses 7631-86-9, Silica, uses
 7647-14-5, Sodium chloride, uses 7681-11-0, Potassium iodide, uses
 9003-53-6, Polystyrene

(micron-sized particle manipulation
 and surface patterning by hollow-fiber laser guidance in)

direct-write lithog.)

L65 ANSWER 6 OF 9 HCA COPYRIGHT 2003 ACS

116:68219 Characterization of cadmium sulfide colloids in reverse micelles. Robinson, Brian H.; Towey, Thomas F.; Zourab, Shehata; Visser, A. J. W. G.; Van Hoek, A. (Sch. Chem. Sci., Univ. East Anglia, Norwich, NR4 7TJ, UK). Colloids and Surfaces, 61, 175-88 (English) 1991. CODEN: COSUD3. ISSN: 0166-6622.

AB Colloidal **microparticles** of the photosemiconductor CdS were prepd. in reverse micelles of water/**Aerosol** OT/n-heptane. Particle sizes were estd. by UV-visible absorbance measurements and by anal. ultracentrifugation. Under the conditions used, reproducible and stable particles are formed at low w values, but the particle dispersion becomes unstable and sediments at higher w values (>15) (where $w = [H_2O]/[AOT]$). Photodegrdn. also was obsd. at $w \geq 10$. The UV-visible measurements show that particle growth (which has been attributed to Ostwald ripening) takes place on a timescale of hours at low w values (i.e. 25 and 5). Ultracentrifugation data support the conclusion from absorbance measurements that growth is taking place in the system. Photoluminescence emission spectra consist of broad, overlapping bands, the intensities decreasing with increasing w. Photoluminescence is quenched by addn. of water to an already-equilibrated particle dispersion. Furthermore, the photoluminescence increases with decreasing temp. and is not dependent on O content. The anal. of photoluminescence lifetimes is complicated since the decay transients are multi-exponential in form. The av. lifetime is shorter on the high energy side of the emission and essentially independent of particle size, in agreement with previous studies on CdS colloids prepd. in isopropanol glasses.

IT 1306-23-6, Cadmium sulfide, properties
(colloidal particles of, in reverse micelles)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 72, 74, 76

ST cadmium sulfide **semiconductor** colloid reverse micelle;
luminescence micelle growth colloid **semiconductor** particle

IT 1306-23-6, Cadmium sulfide, properties
(colloidal particles of, in reverse micelles)

IT 142-82-5, Heptane, properties 577-11-7, **Aerosol** OT
(micelles, cadmium sulfide colloid particle prepn. in reverse)

L65 ANSWER 7 OF 9 HCA COPYRIGHT 2003 ACS

104:198054 A new procedure for thin-film deposition by solution **spraying**. Savio, M. Lo; Oliveri, M. E. (Dip. Fis., Univ. Catania, Catania, I-95129, Italy). Applied Physics A: Solids and Surfaces, A39(4), 269-71 (English) 1986. CODEN: APSFDB. ISSN:

0721-7250.

AB The major reasons for the low photovoltaic efficiency of Cu₂S/CdS cells, in which the CdS film is deposited by **spraying**, are due to small film thicknesses which do not exceed 4 .mu.m and the small av. grain size which ranges from 0.1 to 0.5 .mu.m. A new exptl. "soln. **spraying**" procedure is described that prevents both restrictions by controlling the substrate temp. Av. grain **sizes** of >1 .mu.m are obtained.

IT 1306-23-6, uses and miscellaneous
(film deposition of large-grained, by soln. **spraying**
for increased photovoltaic efficiency)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd==S

CC 76-5 (Electric Phenomena)

Section cross-reference(s): 52

ST cadmium sulfide photovoltaic film **spraying**

IT Photoelectric devices

(cadmium sulfide film deposition for, by soln. **spraying**
for increased grain size)

IT 1306-23-6, uses and miscellaneous
(film deposition of large-grained, by soln. **spraying**
for increased photovoltaic efficiency)

L65 ANSWER 8 OF 9 HCA COPYRIGHT 2003 ACS

97:25211 Thin film deposition of cadmium sulfide. Muruska, H. Paul; Sansregret, Joseph L.; Young, Archie R. (Exxon Research and Engineering Co. , USA). U.S. US 4331707 A 19820525, 5 pp. (English). CODEN: USXXAM. APPLICATION: US 1980-197082 19801015.

AB Thin films of CdS, useful as photoconductive **semiconductors**, are prepd. by forming thin layers of CdO by **spray** pyrolysis of Cd salts in aq. or org. solvents and converting the CdO to CdS by annealing it in hot, gaseous S. Thus, a 0.1 M soln. of Cd(NO₃)₂ in MeOH contg. 10 mol% InCl₃ was **sprayed** at 3.0 mL/min on borosilicate glass heated to 400-450.degree. to give a 0.4-.mu. film of CdO which was heated in H₂S at 500.degree. for 30 min and then in 500 mL H₂S/min to give a film with grain **size** 3 .mu. and elec. resistance 60 .OMEGA.-cm, having circular surface features with diam. 20-40 .mu..

IT 1306-23-6P, preparation
(thin films, prepn. of)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd==S

IC B05D001-02; B05D003-02; B05D003-04

NCL 427074000

CC 42-2 (Coatings, Inks, and Related Products)

Section cross-reference(s): 52

IT 1306-23-6P, preparation
(thin films, prepn. of)

L65 ANSWER 9 OF 9 HCA COPYRIGHT 2003 ACS

89:35175 Structure and morphology of chemical-**sprayed** cadmium sulfide films. Berg, R. S.; Nasby, R. D.; Lampkin, C. (Sandia Lab., Albuquerque, NM, USA). Journal of Vacuum Science and Technology, 15(2), 359-62 (English) 1978. CODEN: JVSTAL. ISSN: 0022-5355.

AB CdS films were prepd. by **spraying** .apprx.0.1-M aq. solns. of CdCl₂ and NH₂CSNH₂ (thiourea) onto SnO₂-coated glass substrates heated to 380.degree.. The films developed very intricate surface morphologies consisting of a variety of nodular and serpentine structures about 5-10 .mu.m in **size**. Grain sizes were about 200 nm, with their c-axis generally normal to the local surface. The grain structure and morphol. produce very large optical scattering and high effective absorption for wavelengths larger than the CdS band-gap wavelength of 500 nm. Films 3-4 .mu.m thick typically have effective absorption consts. of about 500 cm⁻¹ at 1000-nm wavelength. The films were relatively impure, with total impurity contents of about 2 wt.% consisting of reaction products (principally C), impurities picked up from the **spray** process (O, Fe, and others), and mobile glass species (such as Na and K). These impurities may be an important factor in limiting grain size. Elec., the carrier concns. are on the order of 10¹⁶ cm⁻³, with mobilities of the order of 10 cm²/V s. Some of the effects of these properties on fabricated CdS/Cu₂S photovoltaic devices are discussed.

IT 1306-23-6, uses and miscellaneous
(morphol. and structure of chem.-**sprayed** films of, for photoelec. applications)

RN 1306-23-6 HCA

CN Cadmium sulfide (CdS) (9CI) (CA INDEX NAME)

Cd=S

CC 76-9 (Electric Phenomena)

Section cross-reference(s): 52, 73, 75

IT Electric current carriers
(concn. and mobility of, in cadmium sulfide chem.-**sprayed** films)

IT Crystal form
Optical absorption
(of cadmium sulfide chem.-**sprayed** films)

IT 1306-23-6, uses and miscellaneous
(morphol. and structure of chem.-**sprayed** films of, for photoelec. applications)

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L66 46 S L59 NOT L65

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L66 ANSWER 1 OF 46 HCA COPYRIGHT 2003 ACS

TI Synthesis and photoluminescence of spherical ZnS:Mn²⁺ particles

L66 ANSWER 2 OF 46 HCA COPYRIGHT 2003 ACS

TI Method for producing fine particle by salt-assisted **aerosol** thermal decomposition

L66 ANSWER 3 OF 46 HCA COPYRIGHT 2003 ACS

TI Time-resolved studies of the interactions between pulsed lasers and **aerosols**

L66 ANSWER 4 OF 46 HCA COPYRIGHT 2003 ACS

TI Thermal treatment effects in the photovoltaic conversion of **spray**-painted TiO₂ coatings sensitized by chemically deposited CdSe thin films

L66 ANSWER 5 OF 46 HCA COPYRIGHT 2003 ACS

TI Sensitization of screen-printed and **spray**-painted TiO₂ coatings by chemically deposited CdSe thin films

L66 ANSWER 6 OF 46 HCA COPYRIGHT 2003 ACS

TI Microstructure of nanocrystalline CdS powders and thin films by Electrostatic Assisted **Aerosol** Jet Decomposition/Deposition method

L66 ANSWER 7 OF 46 HCA COPYRIGHT 2003 ACS

TI Reverse Micellar Synthesis of a **Nanoparticle**/Polymer Composite

L66 ANSWER 8 OF 46 HCA COPYRIGHT 2003 ACS

TI Stir-in pigment compositions for coloring high-molecular weight materials

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TI Synthesis, microstructure and optical properties of ZnS films formed by electrostatic assisted **aerosol** jet deposition

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TI Protectively coated phosphors

L66 ANSWER 11 OF 46 HCA COPYRIGHT 2003 ACS

TI Unusual forms of amorphous silica from submarine warm springs, Juan de Fuca Ridge, northeastern Pacific Ocean

L66 ANSWER 12 OF 46 HCA COPYRIGHT 2003 ACS

TI Solar blind optical photodetectors based on monocrystalline zinc

sulfide

- L66 ANSWER 13 OF 46 HCA COPYRIGHT 2003 ACS
TI On properties and structure of the AOT-water-isooctane reverse micellar microreactor for **nanoparticles**
- L66 ANSWER 14 OF 46 HCA COPYRIGHT 2003 ACS
TI Nanoparticulate film precursors to CIS solar cells: **spray** deposition of Cu-In-Se colloids
- L66 ANSWER 15 OF 46 HCA COPYRIGHT 2003 ACS
TI CIGS films via **nanoparticle spray** deposition: attempts at densifying a porous precursor
- L66 ANSWER 16 OF 46 HCA COPYRIGHT 2003 ACS
TI High-quality CdTe films from **nanoparticle** precursors
- L66 ANSWER 17 OF 46 HCA COPYRIGHT 2003 ACS
TI CdTe Thin Films from **Nanoparticle** Precursors by **Spray** Deposition
- L66 ANSWER 18 OF 46 HCA COPYRIGHT 2003 ACS
TI **Spray** deposition of CdTe thin films using **nanoparticle** precursors
- L66 ANSWER 19 OF 46 HCA COPYRIGHT 2003 ACS
TI Process for producing zinc aluminate-containing particulate compositions
- L66 ANSWER 20 OF 46 HCA COPYRIGHT 2003 ACS
TI CdTe thin films: **spray** deposition using a **nanoparticle** ink precursor
- L66 ANSWER 21 OF 46 HCA COPYRIGHT 2003 ACS
TI Production by binary **nanoparticles** (BiCu, BiTe, CdS) by **aerosol** process: treatment for isolation and concentration
- L66 ANSWER 22 OF 46 HCA COPYRIGHT 2003 ACS
TI Nanocrystalline solutions as precursors to the **spray** deposition of CdTe thin films
- L66 ANSWER 23 OF 46 HCA COPYRIGHT 2003 ACS
TI **Nanoparticle** precursor route to low-temperature **spray** deposition of CdTe thin films
- L66 ANSWER 24 OF 46 HCA COPYRIGHT 2003 ACS
TI Morphological features in films of CdS prepared by chemical **spray** pyrolysis
- L66 ANSWER 25 OF 46 HCA COPYRIGHT 2003 ACS
TI Characterization of thin film ZnO/ZnCdS/CuGaSe₂ heterojunctions

- L66 ANSWER 26 OF 46 HCA COPYRIGHT 2003 ACS
TI A novel preparation method and investigation of **sprayed** cadmium sulfide films
- L66 ANSWER 27 OF 46 HCA COPYRIGHT 2003 ACS
TI Photovoltaic performance of zinc oxide/zinc cadmium sulfide (ZnCdS)/copper gallium selenide(CuGaSe₂) thin film heterojunction
- L66 ANSWER 28 OF 46 HCA COPYRIGHT 2003 ACS
TI A method of preventing glaze defects
- L66 ANSWER 29 OF 46 HCA COPYRIGHT 2003 ACS
TI The effects of pH and adsorbed hydrolyzed metal ions on the photodissolution of colloidal cadmium sulfide
- L66 ANSWER 30 OF 46 HCA COPYRIGHT 2003 ACS
TI Chemical compound powder
- L66 ANSWER 31 OF 46 HCA COPYRIGHT 2003 ACS
TI Electrophotographic photoconductor comprising cadmium and zinc sulfides
- L66 ANSWER 32 OF 46 HCA COPYRIGHT 2003 ACS
TI Photochemistry of colloidal cadmium sulfide. 2. Effects of adsorbed methyl viologen and of colloidal platinum
- L66 ANSWER 33 OF 46 HCA COPYRIGHT 2003 ACS
TI Photochemical hydrogen production using cadmium sulfide suspensions in **aerated** water
- L66 ANSWER 34 OF 46 HCA COPYRIGHT 2003 ACS
TI Powder marking composition
- L66 ANSWER 35 OF 46 HCA COPYRIGHT 2003 ACS
TI Strengthening of steel by the method of **spraying** oxide particles into molten steel stream
- L66 ANSWER 36 OF 46 HCA COPYRIGHT 2003 ACS
TI Electrochemical photocell using a lithium-doped cadmium sulfide film anode
- L66 ANSWER 37 OF 46 HCA COPYRIGHT 2003 ACS
TI II-VI Compound solar energy convertors
- L66 ANSWER 38 OF 46 HCA COPYRIGHT 2003 ACS
TI Electrochemical solar cell based on a **sprayed** cadmium sulfide film photoanode
- L66 ANSWER 39 OF 46 HCA COPYRIGHT 2003 ACS
TI Photovoltaic energy conversion with n-cadmium sulfide-p-cadmium telluride heterojunctions and other II-VI junctions

- L66 ANSWER 40 OF 46 HCA COPYRIGHT 2003 ACS
TI Pigment powder developers for electrostatic and other imaging processes
- L66 ANSWER 41 OF 46 HCA COPYRIGHT 2003 ACS
TI Abrasion-resistant electrophotographic plates
- L66 ANSWER 42 OF 46 HCA COPYRIGHT 2003 ACS
TI Electrophotosensitive materials and photosensitive elements
- L66 ANSWER 43 OF 46 HCA COPYRIGHT 2003 ACS
TI Electric lamp interior coating from agglomerates of silica coated with a pigment
- L66 ANSWER 44 OF 46 HCA COPYRIGHT 2003 ACS
TI Photoconductive cadmium sulfide layers
- L66 ANSWER 45 OF 46 HCA COPYRIGHT 2003 ACS
TI Behavior of an **aerosol** cloud in a plastic chamber
- L66 ANSWER 46 OF 46 HCA COPYRIGHT 2003 ACS
TI Pigmented particles of high-melting polyesters